SEPTEMBER, 1954

Products finishing

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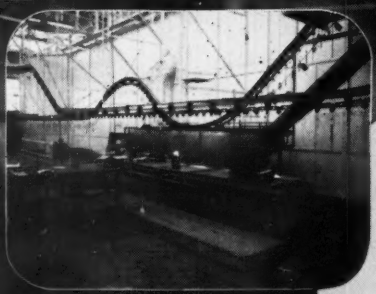
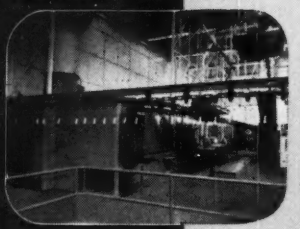
Dual Cincinnati FINISHING SYSTEMS

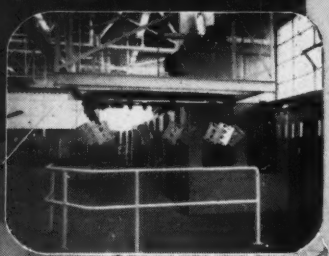


AUTOMATIC PAINT DIP and CHROMODIZER OPERATIONS:

1. Alkaline Clean
2. 1st Rinse
3. Passivate
4. 2nd Rinse
5. Hot Air Blow-Off
6. Paint Dip
7. Oven Bake
8. Stripper
9. Rinse

For empty conveyor hangers.





save 60% in time

. . . for noted aircraft manufacturer

A double conveyor line cleaning and paint finishing system in a well known mid-western aircraft plant handles all sorts of formed aluminum parts up to 15" x 20" in size. Moving at 18 feet per minute, the conveyors carry the parts through the various operations, removing grease, oil and chips prior to painting and assembly.

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SEPTEMBER, 1954

Page No.	Name of Manufacturer	Page No.	Name of Manufacturer

COMPANY_____

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NAME_____ TITLE_____

Your Monthly Source For Finishing Ideas

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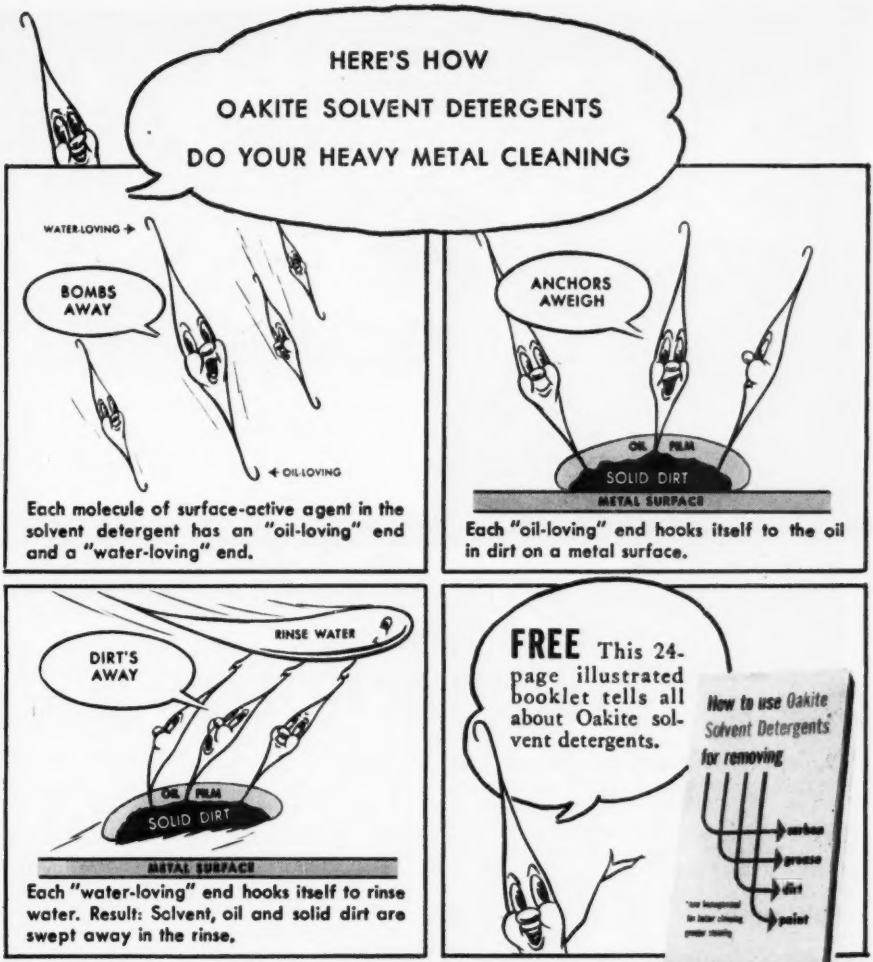
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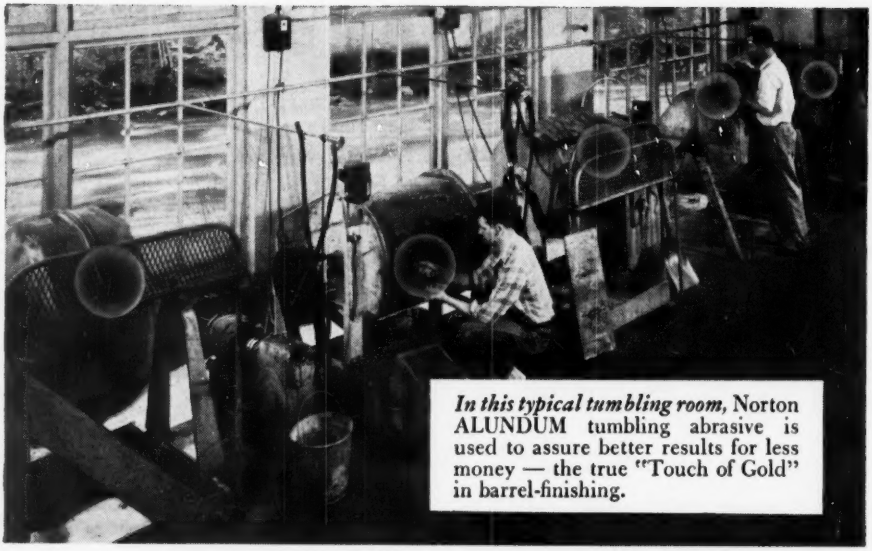

In this typical tumbling room, Norton ALUNDUM tumbling abrasive is used to assure better results for less money — the true "Touch of Gold" in barrel-finishing.

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See your Norton Distributor, and ask him for the new edition of the 55-page booklet on barrel-finishing. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your classified phone directory. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

G-266

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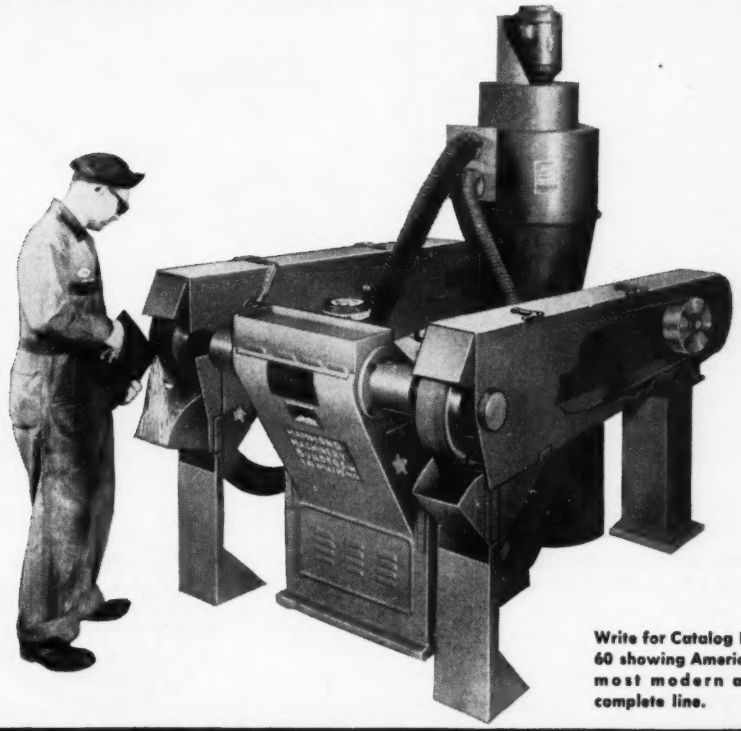

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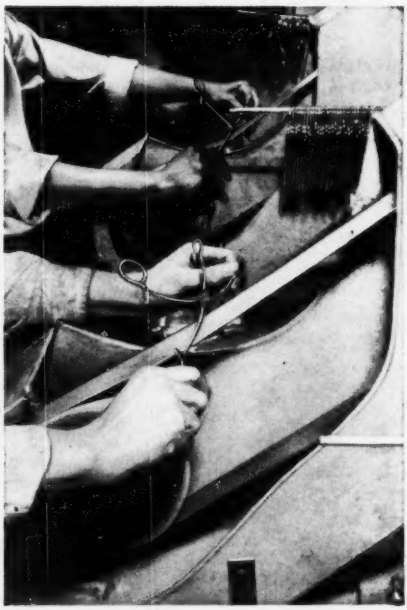

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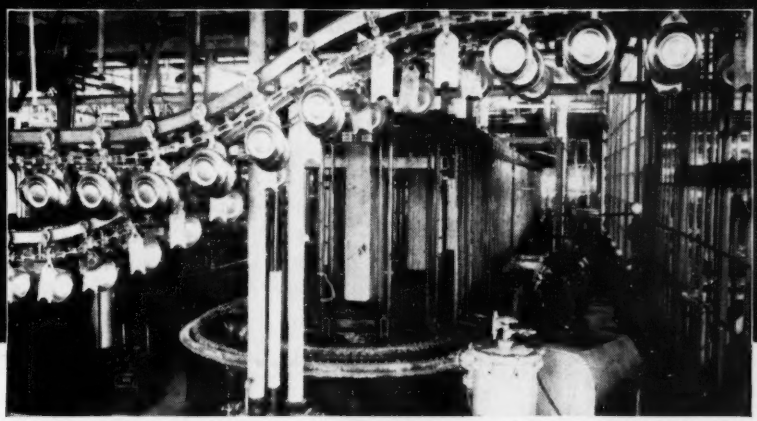

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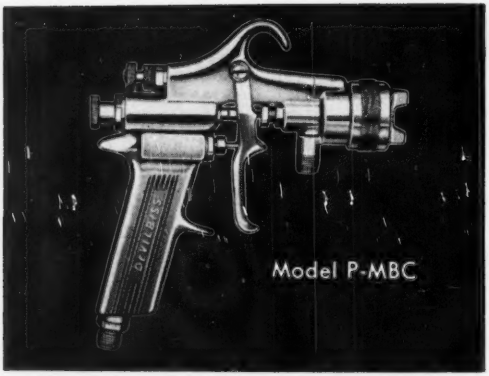

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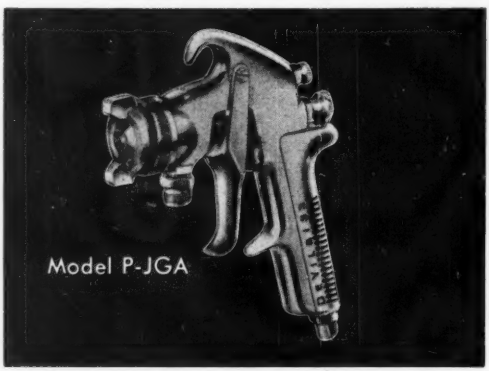

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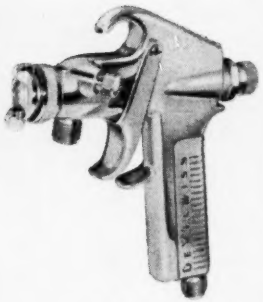

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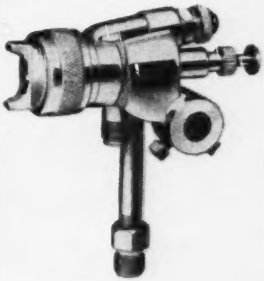

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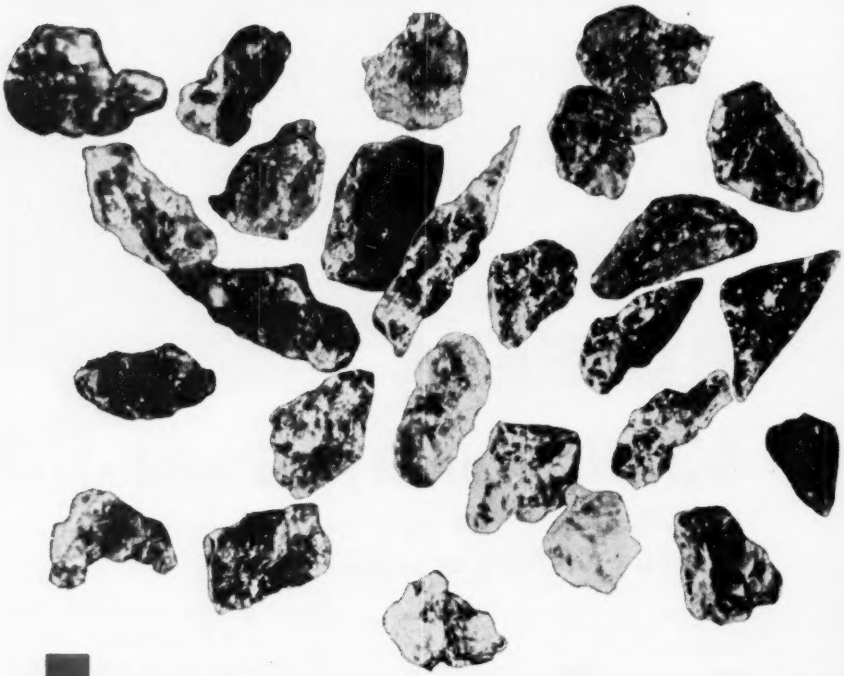

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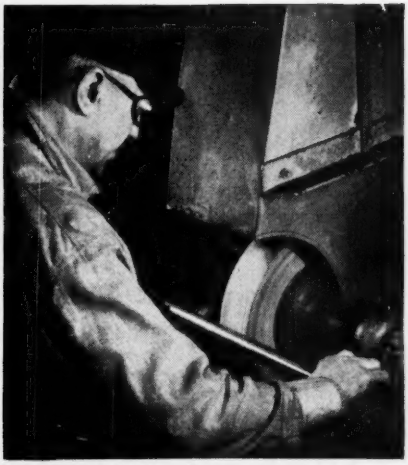
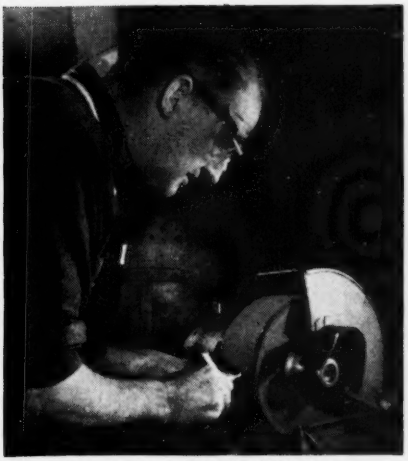
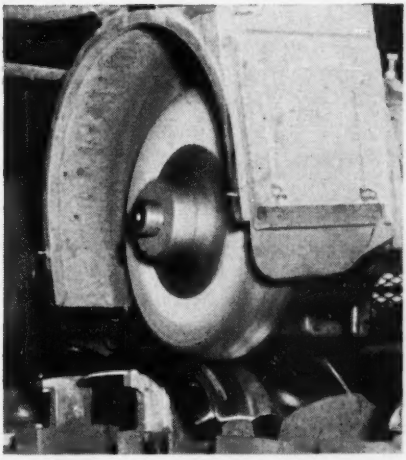


Removing small amounts of stock.

Polishing steel.



Pre-plating polish for high lustre.



Polishing on automatic machines.

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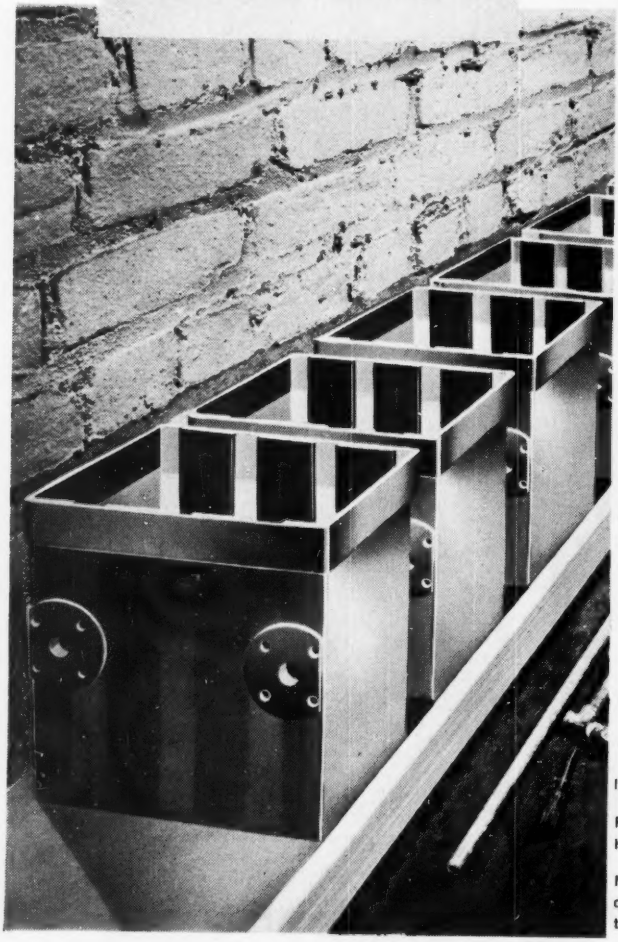
No corrosion in Kodak's cost picture

How Exon 402-A wipes out corrosion



Bleach cells were doomed after 90 days of service at Eastman Kodak processing laboratories. One material after another failed to survive corrosive ferricyanide.

In 1951, Kodak engineers installed a test cell of BOLTARON 6200. Three years later, it's still in use... hasn't been damaged! So convincing was this test that Kodak installed forty-nine more BOLTARON 6200 bleach cells...and wiped out corrosion costs!

Installation by Industrial Plastic Fabricators, Inc.

•

Photographs courtesy
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NOTE: Firestone supplies the resin only, does not manufacture the end product.

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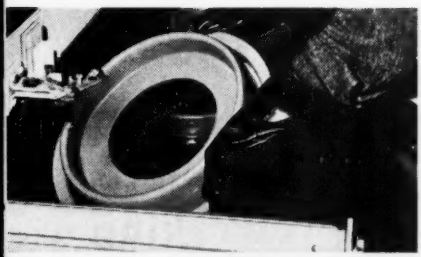
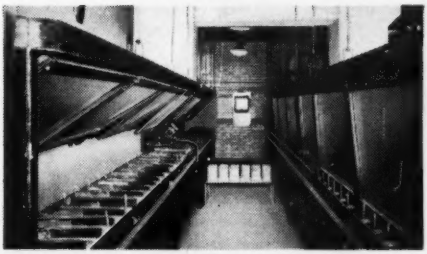
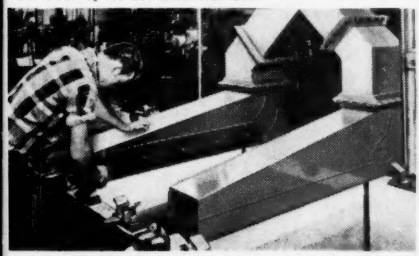


★ A switch to Boltaron 6200 copper-plating ings wiped out corrosion in this equipment ıt Norris-Thermador Co., Los Angeles. Ex- remely close tolerances were maintained. nstallation by Horace Blackman Co.



★ For 18 months, sulfuric acid fumes have failed to corrode a Boltaron fume removal system at Electric Storage Battery Company, Fairfield, Conn.



★ Maintenance costs were wiped out at Can- ıon Electric Co., Los Angeles. A metal-cor- oding solution of 33% nitric, 33% sulfuric ıcid and 33% fluoride salts has left Boltaron lucts and tanks unmarked for a year. nstallation by Horace Blackman Co.

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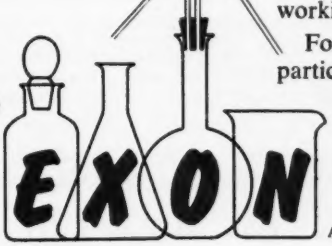

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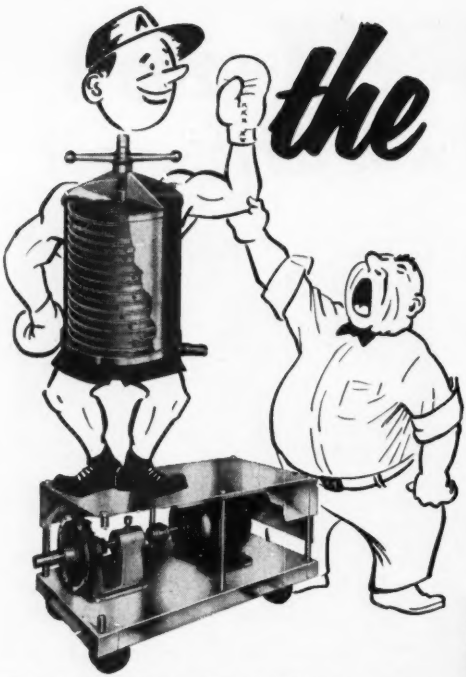

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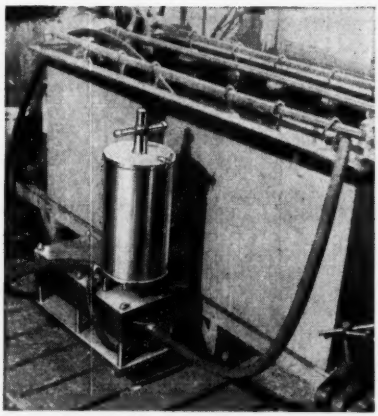

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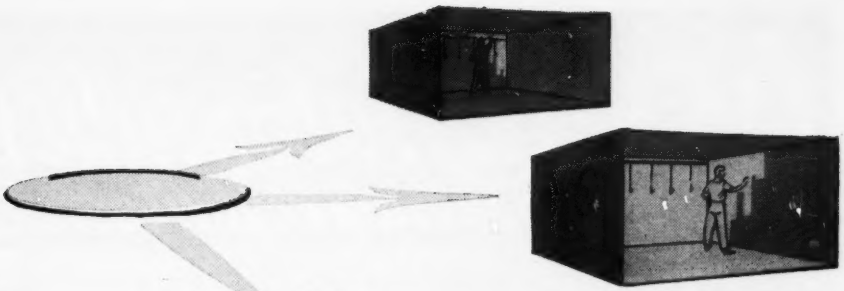

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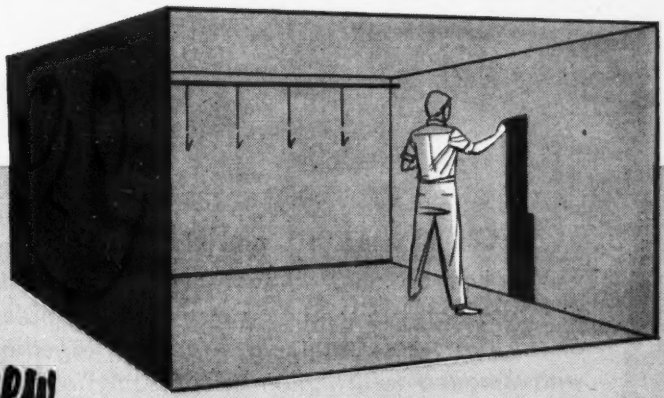

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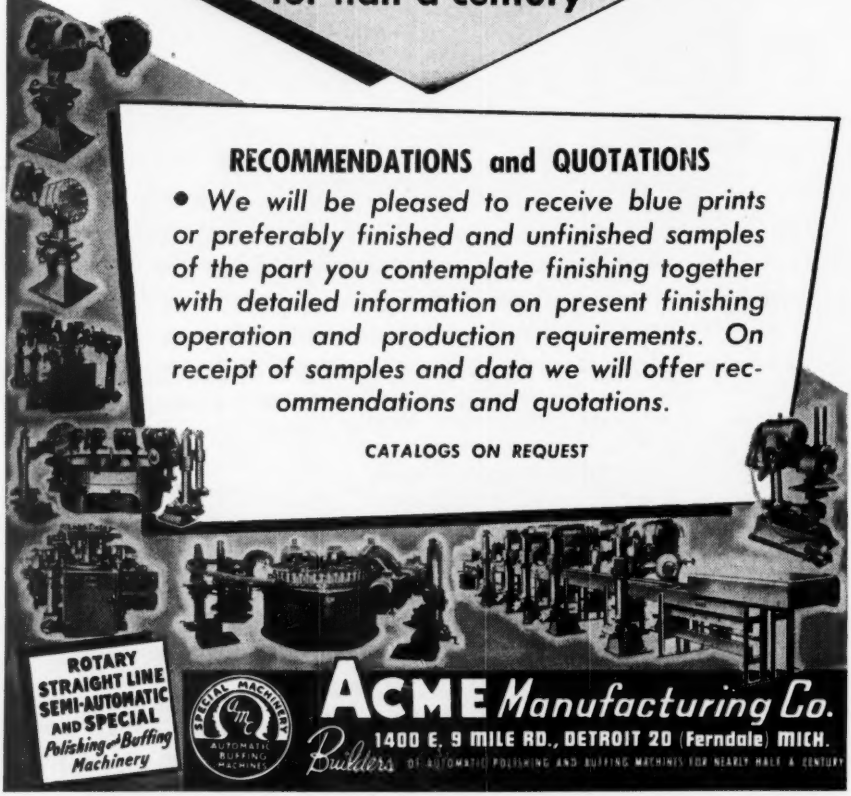

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pf editorial

Vol. 18, No. 12

SEPTEMBER, 1954

Make Use of Today's Bootstraps!

An industry's increase in stature and importance (and annual dollar volume) is generally accompanied or preceded by a rise in the level of technical and practical "know-how" of the people in that industry. Such has been the case with the Finishing Industry. During the past 40 years, it has grown in stature from an auxiliary operation (about which not too much was known) to a full-fledged industry. Much of that progress has been the result of a general rise in the level of technical knowledge of the people in the industry.

To help maintain, and increase this level of technical knowledge, a number of specialized courses of training in finishing technology have been established. Courses in paint technology and protective coatings are given at Illinois Institute of Technology, Polytechnic Institute of Brooklyn, Northeastern University, Los Angeles City College, New York University, St. Joseph's College, Wayne University, North Dakota Agricultural College, Case Institute of Technology, and others. Courses in electroplating are given at Brooklyn Technical High School, Illinois Institute of Technology, University of Pennsylvania, Yale University, and M. I. T., to mention a few. Correspondence courses in electroplating are available from Joseph B. Kushner Electroplating School, Stroudsburg, Pa. Courses in paint finishing technique are conducted at Binks Mfg. Co., Chicago, and the DeVilbiss Co., Toledo, Ohio.

Many companies supplying the Finishing Industry have not only supported research projects to further knowledge on the subject, but also sponsor university scholarships for deserving and interested individuals.

All these sources of training and self-improvement have not been established on a hap-hazard basis, but to fill a definite, growing need on the part of the industry for more trained technicians. These training courses provide today's finishers and would-be finishers with an unusual opportunity for personal development and progress.

Throughout the industrial history of the United States, there have been innumerable examples of men who have literally "raised themselves by their own bootstraps."

It can be done today easier than ever before.

Ezra A. Blount

—EDITOR

Organic Finishes on with Special

By E. C. J. MARSH, B.Sc., FRIC, FIM

Standard Telephones & Cables, Ltd., New Southgate, London, N. 11.

ORGANIC and electroplate finishes serve similar functions insofar as their objective is to provide protection against corrosion, good decorative appearance, or both. The nature of the article to be finished, and its function in service, may decide which type of coating is the more suitable, but in many cases the two may be complementary.

The most important reason for using the combination of electroplate and organic finish is to provide better resistance to corrosion than would be afforded by either finish when employed alone. Other explanations for the choice of the dual coating are:

1. To give improved adhesion to the organic coating; for example, nickel on brass and phosphor bronze.
2. To provide electrical insulation (enamel on electroplated cable supports).
3. To afford outstanding contrast, as in various types of name plates.
4. To satisfy electrical requirements; for example, where electrical contact has to be made to the basis metal (panels and covers for electrical apparatus).
5. To utilize raw material which

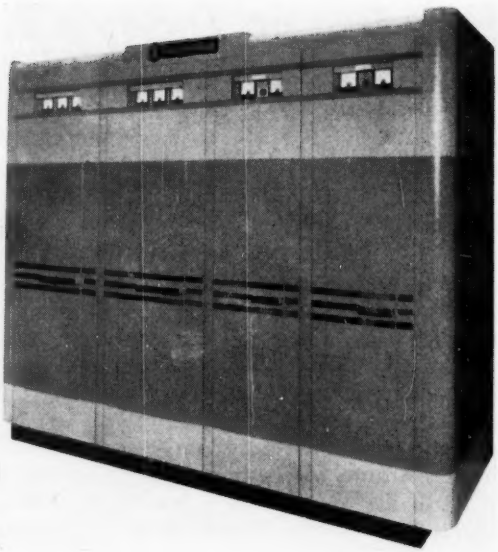

Fig. 1—An external view of a medium power transmitter. The external shell is steel sheet zinc plated or zinc sprayed and enameled with a two-color contrasting scheme. Style strips and handles are satin chromium finish. The name plate at the top of the equipment is cast brass chromium plated with sunken areas black finished.

Electroplate Coatings Reference to Adhesion

is supplied in the electroplated condition (zinc coated steel sheet).

This paper is presented from the practical point of view of the manufacturer who applies such finishes (in this case, the manufacturer of electrical communications equipment), and it is based on procedures developed in production to solve difficulties encountered in fabrication or assembly, or to satisfy service requirements as experienced over a period of years in the field. Further, the work involved in finishing embraces all the basis materials common to engineering, and includes parts fabricated through all known methods. Therefore the problems encountered are probably common not only to the whole of the electrical industry, but to the light engineering industry.

The exigencies of manufacture and of service have become more severe. Apparatus is made to closer limits of performance, produced in larger quantities, and has to be

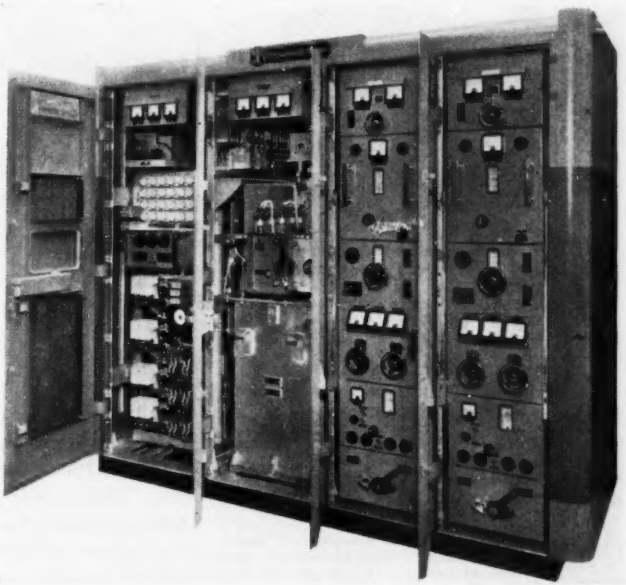

Fig. 2 — The same transmitter with the doors open showing the low and high voltage power compartments and the two radio frequency trucks which can be withdrawn on rails. The panels are generally steel sheet zinc finished and enameled. Many of the unit chasses attached to these panels are sheet brass tin plated. Etch primer is used on the electroplate coatings prior to applying the enamel finishes.

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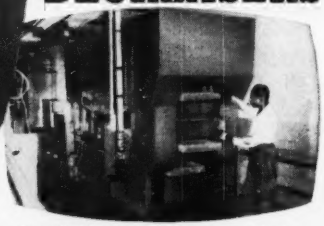

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handled more rapidly through assembly lines. Finishes have to be more robust to withstand these conditions without marking or chipping and they often have to withstand deformation such as curling or bending, as well as engraving, branding or other marking processes (Figs. 1, 2, 3). In service, greater extremes of temperature and of humidity are encountered.

Upon occasion, organic finishes are applied to almost every kind of electroplate coating. Those used, and which offer the greatest practical difficulties, are zinc and cadmium. Chromium is also troublesome. Tin and nickel are fairly extensively involved, and copper, silver and gold less frequently. The organic finishes concerned may be lacquer, enamel, paint or varnish, and the technical problems involved are much the same in each case.

Organic Coatings on Zinc

The primary difficulty with organic coatings on zinc is that of ensuring adhesion. Initial adhesion may be quite satisfactory, but after a short period of time the coating may either soften or become brittle, and adhesion becomes poor. This lack of adhesion is often apparent at the time of assembly. It is certainly noticeable if engraving operations have to be carried out because the coating cracks from the engraving and can be peeled or flaked back.

This deterioration in the organic film is due to reaction between the zinc surface and the organic coating. The acidic constituents in the latter combine with the zinc coating to form a zinc compound which adheres to the under surface of the

organic coating but not to the metal surface. Visual examination of the underside of a flaked enamel coating usually reveals this quite clearly. H. J. Wing ("Industrial and Engineering Chemistry," Feb. '36) reports the results of a limited research on this phenomenon and attributes the failure to the formation of zinc formate.

A standard finish for steel parts in the tele-communications industry is matt zinc plate and lacquer. The lacquer is necessary for protecting the parts from "white rusting" in storage, for giving protection against finger marking in handling during assembly operations, and of course to delay deterioration in service. For reasons of assembly fit, the lacquer has to be thin and must not block tapped holes. It is applied by dipping before the parts are unracked after plating, and, in the case of barrel plated parts, it is applied by a centrifugal process.

For dilution to yield a thin durable film, a lacquer based on high viscosity cellulose nitrate is used. This lacquer coating is found in practice to serve its purpose exceedingly well, but it is inadequate for heavy parts and those which are heavily handled through the subassembly and assembly stages. To meet this requirement, an additional spray coating of lacquer is employed. The desired thicknesses of lacquer coating are ensured by process control, the Ford cup viscometer being employed for checking the lacquer consistency.

These cellulose lacquers have proved to be ineffective on solid zinc surfaces such as those of zinc castings, on galvanized iron, on bright zinc coatings. Adhesion is poor and service life is short.

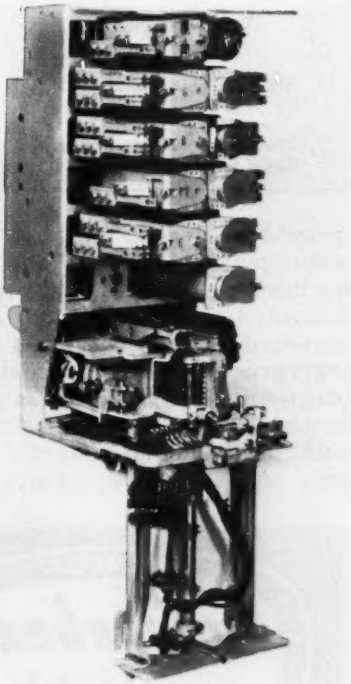

Fig. 3—A 2-motion type telephone selector. The main mounting panel and the box at the rear are zinc plated and lacquered with pigmented cellulose medium. The other miscellaneous small steel parts including clamp plates, screws, pillars, are zinc plated and clear lacquered.

The reason for their success on the matt type of zinc plating used in the telephone industry must therefore be closely associated with the nature of these zinc coatings, particularly structure and porosity. The dip coating of lacquer "impregnates" the coating and provides a firm key for the film and for a

Table I

DATA ON CLEAR COLORLESS CELLULOSE LACQUERS

Type of Lacquer	CHARACTERISTICS	
	Centipoises at 77 deg. F.	Total Solids %
1. High Viscosity Cotton formulation.	1400 to 2000	12.5 to 13.5
2. Special Cellulose/glyptal Resin formulation.	250 to 500	22 to 27

sprayed coating of the same type when applied. On bright zinc plating this does not occur, and a rather different type of lacquer has to be employed. This is one based on a low viscosity nitro-cotton and glyptal resin which has given satisfactory service on solid metals such as polished aluminum, copper and zinc, and also on electroplated nickel. Characteristics of the lacquer are given in Table I.

The electrical communications industry has an extensive need for enamel coatings on zinc plating. There has always been difficulty in obtaining satisfactory adhesion of the enamel to the zinc and retention of such adhesion. Some of the practices used to improve adhesion are:

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Table II

INFLUENCE UPON ENAMEL ADHESION OF CHEMICAL PRETREATMENT OF ELECTRO ZINC PLATINGS
(0.3 mils min.)

Test Conditions	Chemical Pretreatment	Test Period in weeks	Enamel Finish	CONDITION OF ENAMEL	
				On Scratch Test	On Bend Test
Mild Humidity	None	0	Cellulose Enamel (2 coats)	Very good	Very good
		1	ditto	Chipping and flaking. Very poor.	Cracking and flaking. Very poor.
	Chromate	0	ditto	Very good	Very good
		3	ditto	Rather poor	Rather poor
	Phosphate	0	ditto	Very good	Very good
		6	ditto	Very good	Very good
		16	ditto	Chipping and flaking. Very poor.	Cracking and some flaking, rather poor.
	None	0	Baked Enamel (2 coats)	Very good	Very good
		1	ditto	Some chipping, moderate.	Slight cracking, no flaking. Moderate.
		4	ditto	Chipping and flaking, very poor.	Cracking and some flaking, rather poor.
	Chromate	0	ditto	Very good	Very good
		1	ditto	Fairly good	Slight deterioration
		4	ditto	Bad chipping, very poor.	Severe flaking, very poor.
	Phosphate	0	Baked Enamel (2 coats)	Very good	Very good
		6		Very good	Very good
		16		Very good	Cracking, no flaking, fairly good.

1. Abrasive blasting before plating.
2. Abrasive blasting after plating.
3. Selection of special organic finishing media, especially the primer.
4. Ageing or pre-baking the zinc coating before applying the organic finish.
5. Phosphatizing the zinc.
6. Chromating the zinc coating.
7. Tin plating over the zinc.
8. Use of etch primers.

Abrasive blasting before plating is not helpful unless it is quite heavy because the plating obscures the roughness so produced. Abrasive blasting after plating is not an attractive proposition because it means handling the work through an additional operation which removes a portion of the coating, a practice not recommended.

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The selection of suitable organic media is a large task and it is undoubtedly correct to state that all the usual organic media, cellulose, air drying oil base, air drying synthetics, baking oil types and baking synthetics, have been used without offering any solution to the problem. Special primers, both cellulose and baking types, have been developed for the purpose, and some have shown promise on test, but have failed to live up to such promise in extended production use.

The behavior of zinc plating produced under a range of process conditions from alkaline zinc cyanide and acid zinc sulfate electrolytes, has been studied carefully without giving any solution to the problem. The first practical assistance to the problem came with the availability of the modern phosphatizing processes. The process that has been found of most benefit is that using a zinc phosphate type of solution with nitrate accelerators. In this, the zinc plated work is treated by immersion in the hot solution, with a processing time of about three to five minutes.

The chromate treatments which are extensively used to improve the resistance of zinc to "white rusting" under damp conditions, have also been employed to augment the adhesion of organic coatings.

Zinc plated panels are extensively used in the communications industry where good electrical contact is required to the reverse surface, the front surface being enameled for appearance reasons. Chro-

Table III

INFLUENCE UPON ENAMEL ADHESION OF CHEMICAL PRETREATMENT OF ELECTRO CADMIUM PLATING
(0.3 mils min.)

Test Conditions	Chemical Pretreatment	Test Period in weeks	Enamel Finish	CONDITION OF ENAMEL	
				On Scratch Test	On Bend Test
Mild Humidity	None	0	Cellulose Enamel (2 coats)	Bad chipping, very poor.	Flakes easily, very poor.
	Chromate	0	ditto	Chipping, rather poor.	Cracking, easly removed, poor.
		1	ditto	Bad chipping, very poor.	Flakes easily.
	Phosphate	0	ditto	Very good	Very good
		1	ditto	Very good	Cracking and flaking, rather poor.
		4	ditto	Slight chipping, fairly good	Cracking and flaking, rather poor.
Open Atmosphere	Chromate	4	ditto	Chipping and flaking, very poor.	Cracking and flaking, very poor.
	Phosphate	4	ditto	ditto	ditto
Mild Humidity	None	0	Baked Enamel (2 coats)	Slight chipping and flaking, very poor.	Cracking and flaking, very poor.
	Chromate	0	ditto	Very good	Very good
		1	ditto	Slight chipping	Cracking, no flaking, good.
		4	ditto	Slight chipping and flaking.	Cracking and flaking easily, very poor.
	Phosphate	0	ditto	Very good	Very good
		1	ditto	Very good	Cracking, no flaking, good.
		4	ditto	Very good	ditto
Open Atmosphere	Chromate	4	ditto	Very good	Cracking, but no flaking, good.
	Phosphate	4	ditto	Very good	Very good

mating is satisfactory for pretreatment and moreover it gives protection to the bare zinc against white rusting. Much of the protective value of chromating of certain types is lost if the film is subjected to dry heat conditions. Alkali bleached passivation processes can be devised to withstand such heating.

Table II compares organic finishes on zinc plate. The mild humidity test conditions comprised control to approximately 75 per cent humidity at 130 deg. F. during an 8-hour day, and cooling off with rise to 100 per cent humidity and condensation during the night. With the cellulose coatings, it will be seen that without treatment of the zinc, the organic film is very short-lived. Chromate treatment gives appreciable improvement, as does the phosphate treatment. With the baked enamel finish, the chromate treatment shows little benefit, whereas the phosphate treatment is valuable.

Adhesion of organic films to zinc plate has been obtained for opaque coatings with the "etch primer" type of medium. It is based on vinyl butyral-resin and the primer is provided in two separate solutions. One of these contains the film forming resin, and a special form of zinc chromate inhibitive pigment, namely, tetrahydroxy zinc chromate, the

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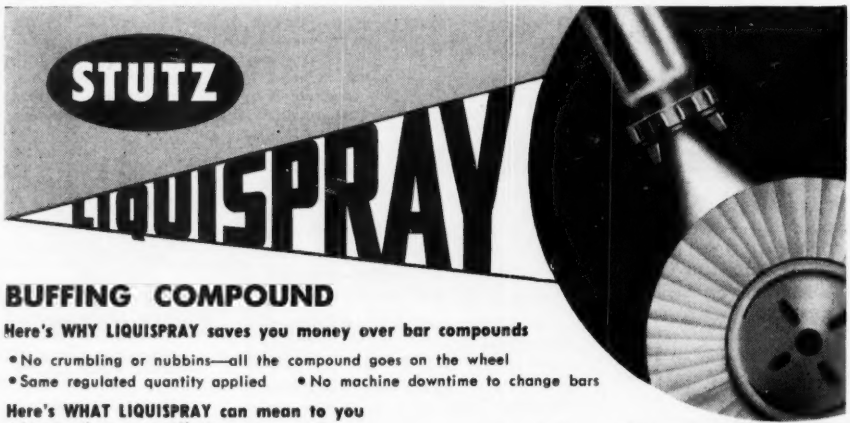
solvents being alcoholic type. The second solution contains phosphoric acid in alcoholic solvents. The two solutions are mixed thoroughly in specified proportions, and allowed to stand ¼ hour before use.

The mixture has a "can-life" of a few hours, and therefore very rigid process control has to be employed to ensure that the mixed material is used within the specified time. The reactions occurring in the applied film are fairly complex, but one of these appears to be reaction between the phosphoric acid and the zinc coating. If the right quality of etch-primer is selected and properly employed, it may be air dried or baked, and it may be over-coated with cellulose, air drying or baking media, and the resulting finish exhibits extraordinary adhesion to the zinc.

Organic Finishes on Cadmium

Organic finishing on electroplated cadmium is more difficult than it is upon matt zinc. This may be due to the fact that cadmium generally gives more dense and smoother films. The normal types of clear cellulose lacquer provide little adhesion, and the best available is the special cellulose glyptal resin formulation previously mentioned. The chromate or phosphate treatments provide some assistance.

Table III gives some data for cellulose and baked enamel finishes on cadmium plating, with and without chromate or phosphate treatments, under the mild humidity test, and when exposed to open atmosphere. On the cellulose finishes the chromate treatment gives a little



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improvement, and the phosphate treatment a measurable improvement under mild humidity conditions, and both give appreciable improvement under open atmospheric exposure. With the baked enamel finishes, the chromating gives appreciable improvement, and the phosphatizing treatment is again rather better, this applying to both sets of test conditions.

With both zinc and cadmium coatings, a procedure that has been fairly extensively used in industry in recent years is over-coating with a thin electroplating of tin before organic finishing. This is quite a reasonable procedure, except that it entails an additional electroplating operation. Generally speaking, it gives material help in ensuring adhesion of baked finishes.

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Some data is given in Table IV for humidity and salt spray exposure of plated and enameled specimens. On the mild humidity test the zinc plated specimens failed completely in 7 weeks, whereas with the coating of tin, they were only showing signs of serious failure in 30 weeks. Similarly the cadmium plated specimens which were poor in 7 weeks, and very bad in 30 weeks, showed better performance with the tin coating insofar as they were unimpaired in the 30 week period. On the salt spray test (20 per cent salt solution, spray on for 8 hours, off for 16 hours), the blistering of the enamel finish and corrosion of the plating was greatly reduced by the presence of the tin deposit.

Enamel Finishes on Copper

The problems with adhesion of enamel finishes to copper have been just as serious as those met in the case of zinc and cadmium. In the case of panels and plates that have to be engraved with specified markings, trouble due to the enamel flaking has always been encountered. Light sand blasting after copper plating has given some measure of relief. The problem today is overcome by using the etch primer as the first coat medium.

Organic Finishes on Tin

The application of organic finishes to tin plate, and to components made from commercial tinned steel sheet, much of which today is produced by electro-tin plating followed by coat flowing is extensively practiced. There are no established chemical treatments comparable with the phosphate or chromate treatment for zinc and cadmium

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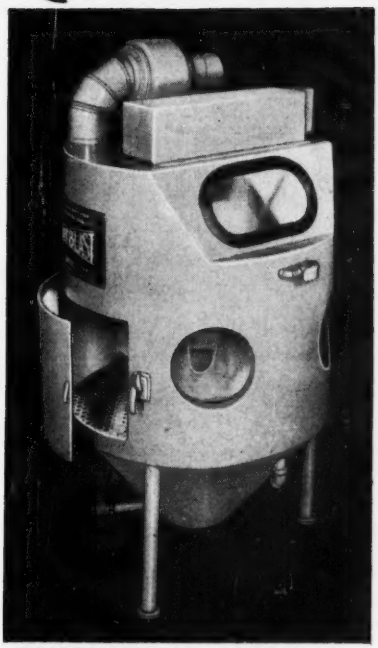

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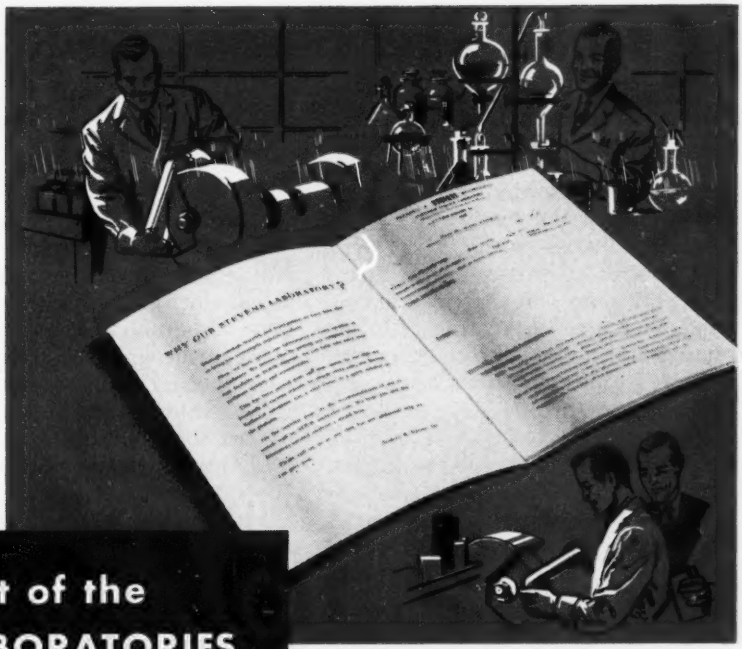
Table IV

INFLUENCE UPON ENAMEL ADHESION OF OVERCOATING OF ELECTRO TIN (0.1 to 0.2 mils) ON ELECTRO ZINC AND ELECTRO CADMIUM PLATINGS (0.3 mils min.)

(Enamel Finish Two Spray coats—primer and finishing—baked)

Test Conditions	Electroplate Finish	Test Period in weeks	CONDITION OF ENAMEL		
			On Scratch Test	On Bend Test	General
Mild Humidity	Zinc	0	Satisfactory	Satisfactory	
		1	Slight chipping	Fine cracking	
		7	Poor	Failed by splitting away from base metal.	
	Zinc plus Tin	0	Satisfactory	Satisfactory	
		1	ditto	ditto	
		7	ditto	Slight cracking	
		16	Slight chipping	No change	
		30	ditto	Tendency to flake from base metal.	
	Cadmium	0	Satisfactory	Satisfactory	
		7	Poor—bad chipping.	Rather poor—cracking	
		30	Very poor—very bad chipping.	Very poor—flaking completely away.	
	Cadmium plus Tin	0	Satisfactory	Satisfactory	
		16	ditto	ditto	
		30	ditto	ditto	
Salt Spray	Zinc	1			Slight blistering
		2			General blistering and some corrosion apparent.
	Zinc plus Tin	1			Very little blistering.
		2			Little change, a few corrosion spots.
		4			Still only a few blisters and corrosion spots.
	Cadmium	1			Very light blistering
		4			No change
		8			Fairly general blistering and some corrosion.
	Cadmium plus Tin	1			Very slight blistering.
		4			No change
		8			Blistering still only slight.



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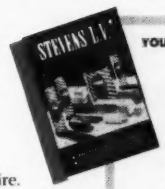

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plating, by which tin plate can be processed to improve adhesion.

Cellulose enamels in general are unsuitable for providing durable finishes on such material, although cellulose media pigmented with aluminum flake powder, and particularly some of the ready mixed aluminum cellulose media, show very much better properties in this direction. They are, in fact, sometimes used as primer coats for cellulose enamel finishes. In the electrical industry, cellulose finishes are essential on components that cannot be baked such as oil and wax filled condensers, transformers and filters. Reasonable performance can be obtained using aluminum cellulose as the first coat, but vastly improved durability is secured using the etch-primer technique.

Baked finishes on electro-tin plate are reasonably good, but again they are improved greatly if an etch primer is employed.

Organic Finishes on Nickel

The application of organic finishes to nickel plate does not present problems of the magnitude encountered with zinc and cadmium, and enamels and lacquers adhere satisfactorily in relation to their type. Mention has already been made of the special cellulose glyptal resin lacquer which is obtainable as a clear colorless medium. This is excellent for applying a thin protective film on dull or polished nickel. It serves the purpose of giving protection against finer marking during assembly, it retards the yellowing of nickel by normal atmospheric oxidation, and it protects it from

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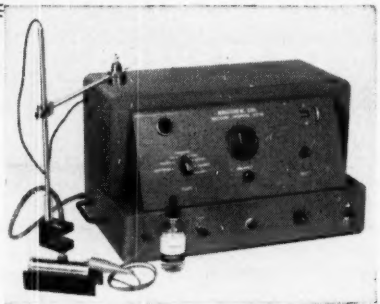

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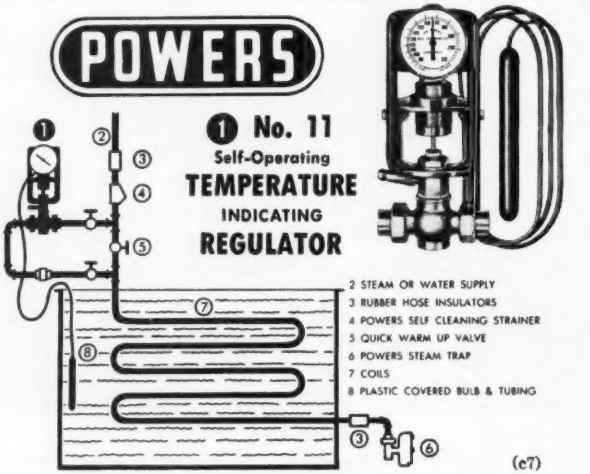
greening under fairly severe conditions of humidity and condensation and industrial atmospheres. It is also useful to apply to nickel plate on iron and steel, particularly in cases where adequately thick coatings of nickel cannot be applied for dimensional reasons; the lacquer seals the pores in the nickel plating and prolongs the period before rusting occurs under humid conditions.

The ordinary cellulose enamels exhibit their normal shortcomings when applied direct to metal work, namely, gradual ageing and shrinkage with embrittlement and loss of adhesion. This can be offset by the use of the etch primer, which ensures retention of adhesion. Baked coatings give very reasonable serviceability provided that they posses the hardness and flexibility required.



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Organic Coatings on Chromium

Chromium plating is another basis to which it is very difficult to assure adhesion of organic films. Name plates may be cited as an example. Large name plates may be cast in brass, the highlights polished and the whole nickel and chromium plated. The background is then enameled in color, generally black. Etch primer exhibits excellent adhesion to chromium, and it is recommended as the basis coat, followed by any good organic medium, either

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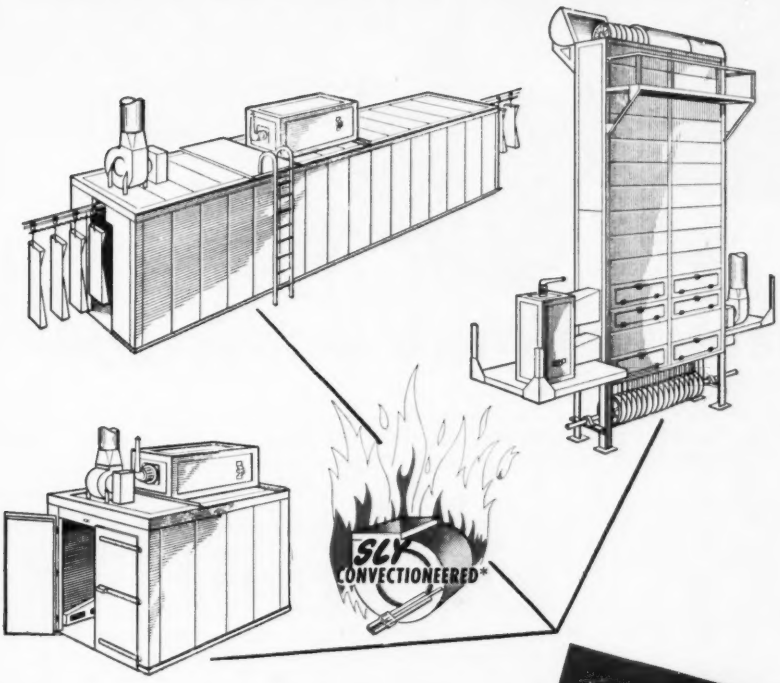

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Table V

VALUE OF ETCH PRIMER AS SHOWN BY WEATHEROMETER TESTS

Metal Coating	Pretreatment	Finish	CONDITION OF ENAMEL		
			On Scratch Test	On Bend Test	Assessment
Zinc	None	Cellulose	Good but enamel soft	Good but enamel soft and could be scraped off.	Rather poor
	Phosphate	ditto	Slight chipping	Enamel powdery	Rather poor
	Etch Primer	ditto	Satisfactory	Satisfactory but enamel could be scraped off the bend with thumb nail.	Good
	None	Baked	Bad chipping	Complete flaking off	Very poor
	Phosphate	ditto	Slight chipping	Cracking, flaking from bend.	Poor
	Etch primer	ditto	Satisfactory	Satisfactory	Very good
Cadmium	None	Cellulose	Slight chipping	Enamel powdery	Very poor
	Etch primer	ditto	Satisfactory	Satisfactory	Very good
	None	Baked	Bad chipping	Complete flaking	Very poor
	Phosphate	ditto	Satisfactory	Cracks and could be scraped off along bend.	Moderate
	Etch primer	ditto	Satisfactory	Satisfactory	Very good
Tin	None	Cellulose	Bad chipping	Easily scraped from bend.	Poor
	Etch primer	ditto	Satisfactory	Satisfactory	Very good
	None	Baked	Satisfactory	Slight flaking	Good
	Etch primer	ditto	Satisfactory	Satisfactory	Very good

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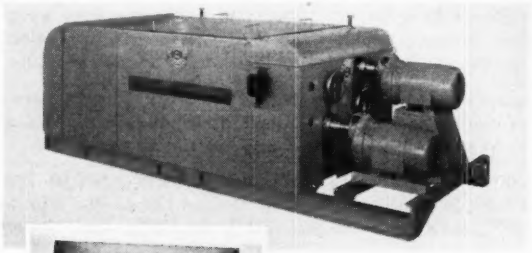
Value of the Etch Primer

In the foregoing, much has been said in favor of the use of the etch primer. The etch primer is a special material, very appropriate for specialized applications, and it so happens that the electrical communications field presents many of these. It must also be remembered that the etch primer must be selected with the same discretion as any other paint medium, and its formulation and production is beset with the same problems and possibilities of error that attend the production of all paints.

Table V summarizes results of a weatherometer test. The test cycle of 24 hours comprised:

a. 17 hours of carbon arc light, with mild moisture spray at intervals of 20 minutes.
b. 3 hours heavy water spray.
c. 2 hours refrigeration between 32 and 22 deg. F.
d. 2 hours for inspection of the panels.

The deposits employed were zinc, cadmium and tin. The pretreatments of the plating for enameling



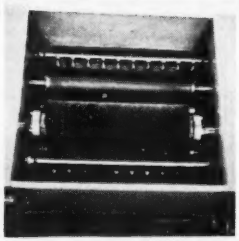


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Table VI

VALUE OF ETCH PRIMER AS SHOWN BY SEVERE HOT HUMIDITY TEST

(Daily cycle, 16 hours at 160 deg. F. with 100 per cent humidity, cooling off for 8 hours with condensation upon the specimen.) All enamel finishes baked.

Basis Metal	Electroplate	Pretreatment of Electroplate	Performance
Steel	Cadmium	None	Blistering of enamel in 1 day.
	ditto	Etch primer	Unaffected in 21 days.
	Zinc	None	Blistering of enamel in 3 days, heavy blistering and corrosion in 5 days.
	ditto	Etch primer	Unaffected in 21 days.
Brass	Tin	None	Blistering in 1 day.
	ditto	Etch primer	Unaffected in 21 days.
	Nickel	None	Blistering in 1 day.
	ditto	Etch primer	Unaffected in 21 days.
	Nickel/Chromium	None	Blistering and bad flaking in 1 day.
	ditto	Etch primer	Unaffected in 21 days.

included phosphate and etch primer. The enameling schemes embraced cellulose and baking. The panels were not examined by scratch and bend tests until the completion of 30 cycles of the test, which is somewhat arbitrarily considered to be equivalent to 18 months of continuous outside exposure with extremes of temperature and humidity. This final assessment is summarized in the table.

Table VI summarizes tests made under severe hot humidity conditions in which a daily cycle of 16 hours at 160 deg. F. and 100 per cent humidity was used, the specimens cooling off in the test cabinet for the remainder of the 8 hour day so that they were exposed to the condensation of moisture. With basis metals of steel and brass, electroplate finishes of cadmium, zinc, tin, nickel and nickel/chromium are

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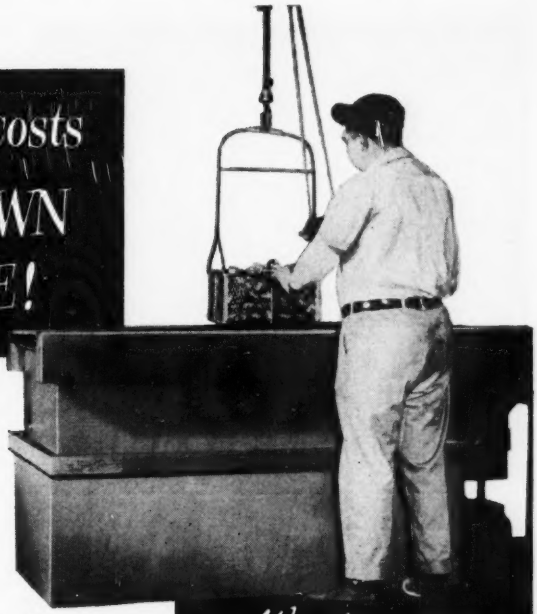

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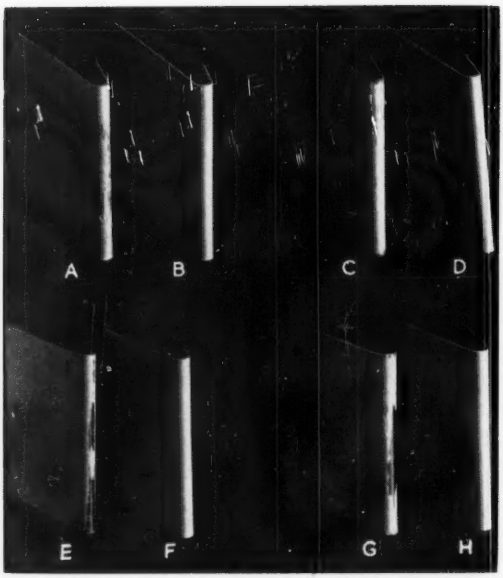

Fig. 4—The British Standard bend test around a ¼ inch diameter mandrel was made on a number of specimens which were subjected to 2 weeks of mild humidity (130-140 deg. F. with 75-85 per cent humidity during the day, cooling off at night with condensation on the specimens) and kept at room temperature for 3 months before bending. The basis metal of samples A and B is cadmium plated steel, of C and D zinc plated steel, and E and F polished nickel plate on brass, and of G and H chromium plated brass. The second (or right hand) specimen of each pair was finished with etch primer beneath the baked enamel coating. Of the first of each pair, the cadmium and zinc specimens were phosphatized, and the nickel and chromium specimens given no pretreatment. On the bend test the enamel adhesion on the etch primer specimens was perfect, showing no tendency to crack or flake and withstanding the thumb nail test. The photograph shows how this contrasts with the specimens which were not etch primed. ***(Illustrations courtesy Standard Telephones and Cables, Ltd.)***

represented, and while enamel finishes applied to the samples direct, failed in one cycle of this test, they withstood twenty-one such cycles without deterioration with the etch primer employed as the pretreatment (see Fig. 4).

Summarizing, some form of "chemical treatment" for electroplated coatings is desirable if the best characteristics of adhesion are to be developed in organic applied coatings. It is essential for zinc, cadmium, copper and chromium, and advantageous for nickel, tin, silver and gold. For zinc and cadmium, practical processes in ascending order of merit are chromating, phosphatizing, tin plating and etch priming; and for the other metallic coatings, etch priming is the most effective treatment.

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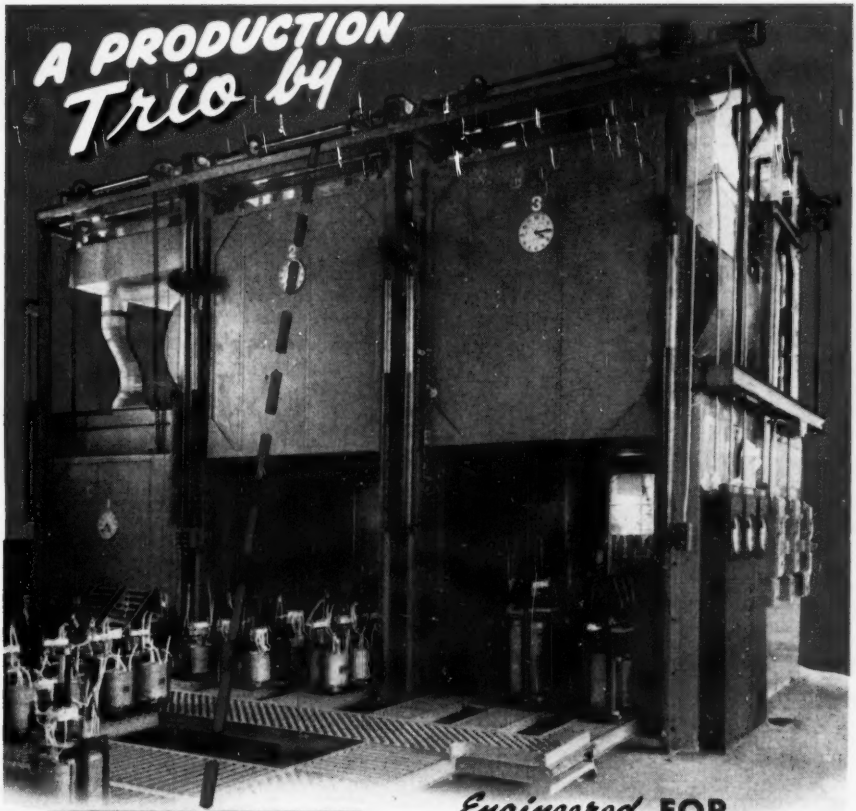
Abstract of a paper presented to International Conference on Metal Finishing, London, 1954, Ref: Trans. Inst. Met. Finishing, 1954, 31, Advance Copy No. 22.



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METAL-FINISHING WASTES

An evaluation of various disposal methods and their applicability to specific waste control conditions

Reference Data Publication compiled by
Metal-Finishing Industry Action Committee

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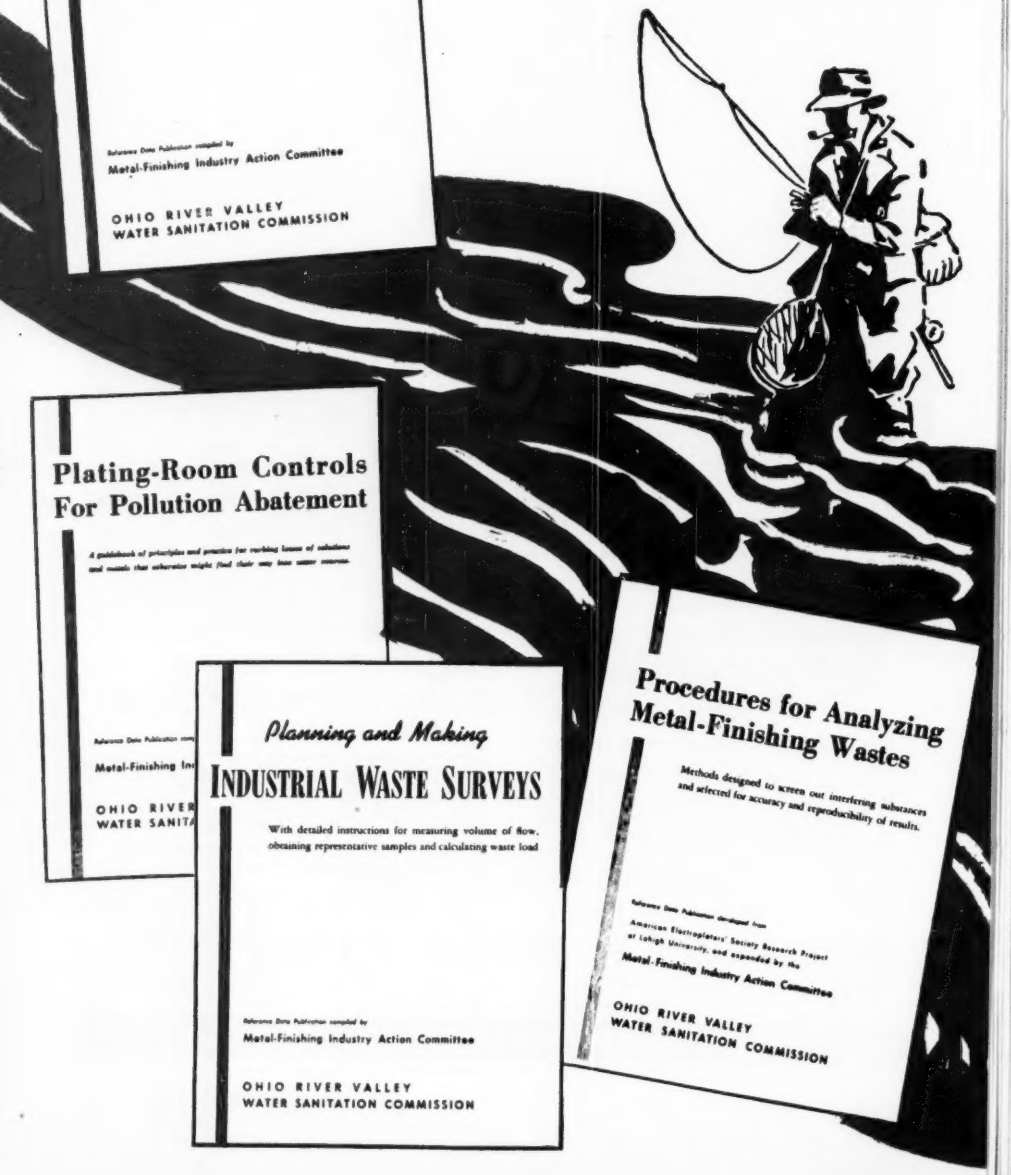
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A guidebook of principles and practice for curbing losses of solutions and metals that otherwise might find their way into water courses.

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INDUSTRIAL WASTE SURVEYS

With detailed instructions for measuring volume of flow, obtaining representative samples and calculating waste load

Reference Data Publication compiled by
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Procedures for Analyzing Metal-Finishing Wastes

Methods designed to screen out interfering substances and selected for accuracy and reproducibility of results.

Reference Data Publication developed from
American Electroplaters' Society Research Project at Lehigh University, and expanded by the
Metal-Finishing Industry Action Committee

OHIO RIVER VALLEY
WATER SANITATION COMMISSION

Metal Finishing Wastes

By ALLEN M. REED,
Chemist, Electric Auto-Lite Company
Member, Metal Finishing Industry Action Committee

THE publication of "Procedures for Analyzing Metal Finishing Wastes" completes a series of manuals which presents in summary form, the best available information on the waste problems of the metal finishing industry. They describe: (1) How to reduce wastes to a minimum by good plant operations; (2) How to measure the volumes of waste; (3) How to analyze contamination in waste waters; (4) How to treat wastes before discharging to a stream or sewer.

These inexpensive manuals, shown on the opposite page, are a result of a cooperative effort of in-

●PLATING-ROOM CONTROLS FOR POLLUTION ABATEMENT

July 1951 (20 pp., 9 illus.) — A guidebook of principles and practice for curbing losses of solutions and metals that otherwise might find their way into water courses. (Price 50 cents).

●METHODS FOR TREATING METAL-FINISHING WASTES

January 1953 (72 pp., 16 drawings) —An evaluation of various disposal methods and their applicability to specific waste control conditions. Compiled by Metal Finishing Industry Action Committee of the Commission. (Price $2.00).

●PLANNING AND MAKING INDUSTRIAL WASTE SURVEYS

April 1952 (44 pp., 27 illus.)—Detailed instructions for measuring volume of flow, obtaining representative samples and calculating waste load. (Price $1.00).

●PROCEDURES FOR ANALYZING METAL-FINISHING WASTES

August 1954 (108 pp., 1 drawing)—Methods of analysis designed to screen out interfering substances common to metal finishing wastes, and selected for accuracy and reproducibility of results. Developed from work of American Electroplaters' Society Research Project, and expanded by the Metal Finishing Industry Action Committee. (Price $1.00).

Manuals available from Ohio River Valley Water Sanitation Commission, 414 Walnut St., Cincinnati 2, Ohio.

dustry and the Ohio River Valley Water Sanitation Commission and are intended to provide guidance and instruction to those interested in the principles and control of pollution abatement.

Waste treatment is actually a step in process. By reducing the volume and concentration of contaminated wastes being discharged from a plant, both material and water are saved, which in turn reduces, if not eliminates, the need for waste treatment. Examples which demonstrate this are:

One plant reduced its copper loss by 68 per cent with the installation of save-rinse tanks.

A company which was losing 400 pounds of cyanide a month to the stream, now loses 1/6 of that (65 pounds each month) after installing fog nozzles.

A small plant in a city had its water bill increased $600 a month when sewer service charges for a new sewage treatment plant were added to the water bill. Installation of automatic cut-offs on the water valves, concentration and re-use of rinse solutions and spray nozzles, cut this water bill by 60 per cent. In addition, copper losses were reduced more than 50 per cent.

Metal finishing operations — cleaning, plating, phosphatizing, anodizing, and similar processes are carried on in large corporations and small shops. There are approximately 13,000 such plants in the United States with the majority located in the Midwest and New England. There are nearly 2,000 in the

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(Guards removed to show detail) Stroke, 7 to 22 feet. Table width, 30" to 50". Table oscillates at turn of valve.

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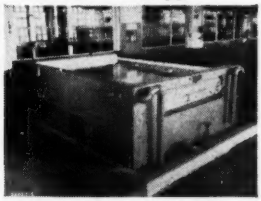
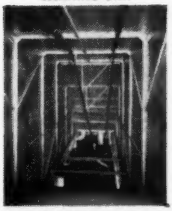


LEAK TEST TANK

TWO COMPARTMENT DEHYDRATION OVEN

FOUR COMPARTMENT DEHYDRATION OVEN

EXIT OF 4 STAGE HI-PRESSURE CLEANING UNIT



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Typical of Peters-Dalton planned engineering are the photographs shown here. They present some of the P-D installations in a multi-storied eastern manufacturing plant. Here, versatility was required—versatility such as P-D know-how and ability to install for proper functioning such varied components as: dehydration ovens, leak test tanks, power spray washers and baking ovens. Efficient and time-saving, these P-D units are in operation on various floors of this plant, to and including a space conserving roof top installation.

Versatility such as this demonstrates P-D ability to take over your plant-wide problems . . . accept the responsibility until *production-ready*—to engineer the layouts, designs and installations up to complete Finishing Systems. Call with confidence upon P-D to solve your problems . . . meet your needs. Just write, wire or phone.

- *Hydro-Whirl Paint Spray Booths*
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area drained by the Ohio River. The waste from these plants—cyanide, metals, acids, cleaning solutions, are discharged to city sewers or into the streams and rivers, and if not properly processed or controlled, may seriously effect the stream or sewer into which it is discharged.

The Ohio River Valley Water Sanitation Commission is an interstate regulatory agency that was established to coordinate the cleanup of streams in the Ohio River basin by the control of pollution from cities and industries. The Commission was created by a compact entered into, with the approval of the Congress of the United States, by Illinois, Indiana, Kentucky, New York, Ohio, Pennsylvania, Virginia, and West Virginia. It was activated on June 30, 1948, and maintains headquarters in Cincinnati, Ohio. (A description of the Commission and its program can be obtained by writing to the Commission office, 414 Walnut Street, Cincinnati, Ohio.)

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Metal Finishing Industry Action Committee

The Commission invited the assistance of industry in developing its pollution abatement program and industry responded to the invitation by organizing advisory committees within the various industries. One of these, the Metal Finishing Industry Action Committee, was organized approximately four years ago with two basic objectives.

1. To define for the Commission and industry the metal finishing waste problem.
2. To act as an advisory committee to the Commission in formulating and promoting an economical and effective abatement program.

In order to accomplish the first objective the Committee recognized that fundamental information on measuring and treating wastes had to be brought together and evaluated. Moreover, this information had to be presented in terms that would permit practical application since many of the plating establishments' waste disposal problems are new and not easily understood. This was done by preparing the above mentioned manuals.

In addition to these manuals, studies were made by the Committee in the fields of toxicity and the policies of pollution abatement. The former is an extensive review of the

to page 60→

avoid stream pollution due to chromium waste...

...with W&T Sulphur Dioxide Reduction Equipment

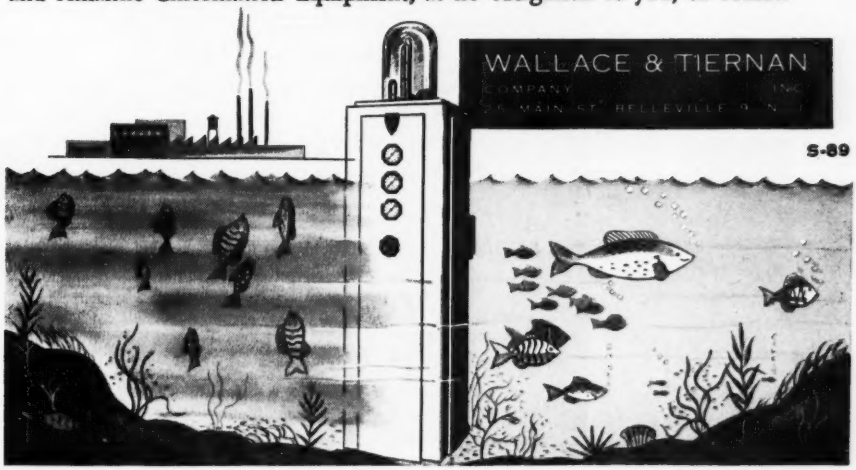
With the proper treatment equipment, toxic hexavalent chromium can be reduced by sulphur dioxide to the trivalent form and then completely precipitated by alkali for standard removal to a disposal area — such as a lagoon. After this treatment the waste water can be drawn off and safely disposed of in the usual manner. This treatment is in full compliance with most local and state pollution abatement laws.

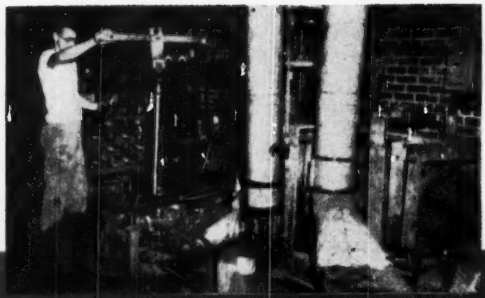
Wallace & Tiernan offers the heat treating and metal finishing industries several types of Sulphur Dioxide Feeders with optional controls for manual, semi-automatic or fully automatic operation. These feeders are adaptable to either the "batch" or "flow-thru" methods of treatment in both large and small plants.

Similar equipment is also available for the destruction of cyanide waste by alkaline chlorination.

W&T offers PROVEN EQUIPMENT — hundreds of similar units are serving industry today, EXPERIENCE — over forty years of building chemical feeding equipment, and SERVICE — field representatives are located in principal cities throughout the country.

Write today for additional information on W&T Sulphur Dioxide Feeders and Alkaline Chlorination Equipment, at no obligation to you, of course.





20-year old Chandeysson Motor Generator in service at Miller Electroplating, Inc., Evansville, Indiana

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Bulletin D-102 contains complete data on specific and overall savings possible with every Chandeysson installation. If you are interested in power savings and power dependability, it will pay you to read this bulletin. Your copy sent promptly, and without obligation.

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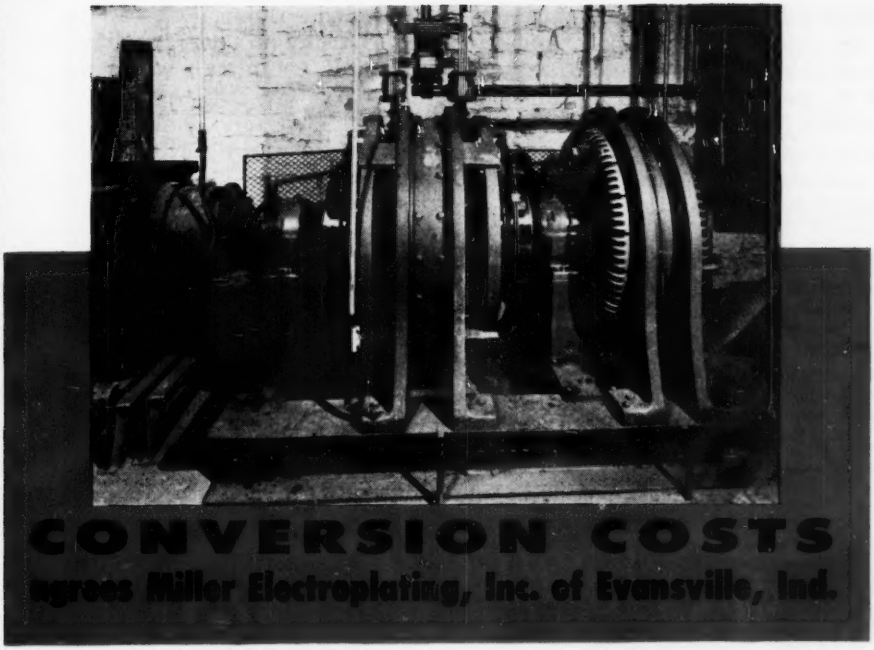

CONVERSION COSTS

agrees Miller Electroplating, Inc. of Evansville, Ind.

16 hours a day for 20 years carrying overloads of 20% to 25% with the only maintenance in all that time being new brushes . . . that's the Chandeysson record at the Miller Electroplating, Inc. It's not an unusual record — there are Chandeysson units still being used after 48 years of economical service!

Read Mr. Miller's actual letter —

"... We have three of your machines in operation in our plant. The last two being purchased after using the first one for over 20 years.

"Our first machine has been in use on the average of 16 hours a day. A great deal of this time, carrying an overload of from 20 to 25% of its rated capacity. During this time the only maintenance expense has been new brushes. It might be of interest for you to know that the commutator has not even been repaired during this time.

"We are indeed thoroughly sold on Chandeysson Plating Generators.

Very truly yours,
MILLER ELECTROPLATING, INC.

Paul E. Miller, Pres.

Any way you say it, or figure it, such performance is proof once again that "Chandeysson cuts power conversion costs." You can expect similar performance from a Chandeysson installation in your plant. Write or mail coupon for full information.

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literature covering the field of toxicity on aquatic life, animals, and humans along with a review of the work of other agencies making similar studies. The latter was a study by the Committee of the policies and procedure of pollution abatement. All these activities have been correlated with the activities of the Commission and the committees representing other industries in order to eliminate duplication of effort and to assure an understanding of the overall pollution abatement program.

The second objective, that of acting as an advisory committee to the Commission, is now reaching its peak of importance. The Committee believes that its opinion represents a composite thinking based on study and experiences that should be most beneficial to industry, the public, and the Commission. The detail work done gives it the background for statements of authority on metal finishing wastes.

The Committee has realized that its obligations were not only to itself and the Commission, but also to all metal finishing establishments in the Ohio River Basin. It is with this understanding that the Committee has made all publications available and has solicited comments on how this joint effort in promoting pollution control could be most effective.

LEATHER,

VINYL, or ARTIFICIAL LEATHER
present no finishing problems in
ADHESION, FLEXIBILITY, COLOR,
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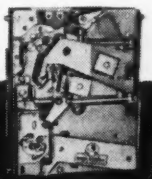
Udylite equipment plates precision parts of this intricate vending machine mechanism

Every coin you drop in a vending machine is weighed, bounced, magnetized and sized . . . and if it is a slug or counterfeit it will be rejected.

Such ingenious machines as manufactured by National Rejectors Company, St. Louis, Mo., require extremely close tolerances and uniformity for the 400 plus parts.

In Udylite Automatic Plating machine, Barrel Platers and Junior Automatics—as used by National Rejectors, you see volume plating at its finest. Millions of parts are turned out in mass-plated quantities for machines that must be fool-proof.

Use of Udylite equipment and supplies are cutting costs, reducing man-hours, and boosting output for hundreds of companies in American industry today. Have you taken a look at your costs—and your competition's methods—lately? Udylite's research, engineering or electrical experts are quickly at your service. Call or write today.



Filed down pennies, washers, lead, zinc, copper, brass and German-silver slugs are all rejected by this sensitive mechanism.

THE Udylite CORPORATION
DETROIT 11, MICHIGAN

WORLD'S LARGEST PLATING SUPPLIER

Finishing Clinic

(For Finishing Problems)

Question. *I would appreciate any information available on the chromium plating of diesel engine crankshafts.* *M. A. H.*

Answer. The salvage of worn engine parts by hard chromium plating is a fully-developed, successful maintenance procedure. As you realize, it is necessary first to grind the worn surfaces to a uniform finish, then calculate the thickness of plating which will be required to restore the part to its proper dimensions. With this information it is possible for the chrome plater to determine how long the part must be in the solution at the current density that is correct for his plating conditions (usually 300 to 500 amp./sq. ft.).

The part to be chromium plated must be masked to insulate all areas except those to be plated. The part is cleaned, pretreated, and then chromium plated. Usually somewhat more chromium must be applied than the calculated amount so that the excess may be ground down after plating to leave a uniform, accurately machined surface.

An article, "Hard Chrome Plating Made Easy," describing some of the techniques and methods for hard chromium plating was published in the December, 1953 issue of PRODUCTS FINISHING and we are forwarding a reprint of that article. Also, we are referring you to several companies from whom you may obtain more detailed information.

——— *fc* ———

Question. *We are enclosing a sample fishing lure with a copper colored crystalline finish with which we are not familiar. Will you please advise us concerning sources of this material, and the trade name?* *H. R. F.*

Answer. The finish appears to be a "hammer" type of finish with a metallic powder incorporated in it to give it the copper color. This paint finish appears to have been sprayed on and baked, and then covered with a finish coat of a clear varnish or lacquer.

We are referring you to several manufacturers who can advise you concerning "hammer" type finishes.

Question. *We are stripping copper in a solution of 2 pounds of chromic acid and 4 fluid ounces of sulfuric acid per gallon of water. The life of the solution seems to be rather short and stripping time soon becomes rather high. Will additions prolong the life of the solution?* *W. J. B.*

Answer. For comparison with your process and conditions you might be interested in the following data. A chromic acid solution made up at 64 oz./gal. chromic acid, and 7 fluid oz./gal. sulfuric acid will strip 0.0007 inch thickness of copper plate in 20 minuates at room temperature when the solution is new. It is current practice in this area to use the solution, without additions, until the stripping time increases to 45 minutes for the same thickness of copper, and then discard the stripping solution. While additions may prolong the life of the solution to a limited degree, it is doubtful if the expense will be justified.

———— *fc* ————

Question. *Our problem is to find a finishing material other than plating that will withstand punching and bending (no sharp corners). We want to finish a strip of steel before forming it into its finished shape.* *A. D. S.*

Answer. You specify that you do not want an electroplated coating. As you know, plated coatings will withstand forming if properly applied.

Paint, varnish, and lacquer manufacturers have been supplying paint finishes for some years now that will withstand forming operations without marring the surface finish if proper precautions are taken. For specific information about the proper finish to use, and the necessary precautions to observe, we recommend that you contact one or more of the following manufacturers of paint finishes. (Companies listed.)

Question. *Do you know of any process or anyone to contact regarding disposal of 1,000 gallons of 10 per cent chromic acid solution?* *A. D. C.*

Answer. The disposal of chromic acid wastes, as well as other wastes, is fully discussed in the manual, "Methods for Treating Metal-Finishing Wastes," available from the Ohio River Valley Water Sanitation Commission, 414 Walnut St., Cincinnati, Ohio, at a cost of $2.00. Generally, the disposal of chromic acid waste involves reduction of the hexavalent chromium to the trivalent condition, followed by precipitation using lime or soda ash.

We are referring you to a source of additional information and recommendations for equipment necessary for waste disposal.

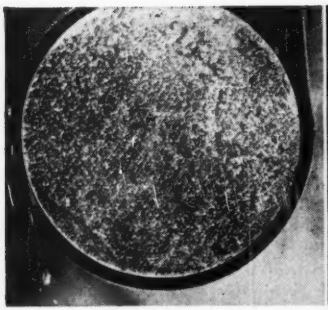
———— *fc* ————

Question. *We must apply a paint finish to an electroplated frame for an electric component. The frame contains 96 holes, varying in size from 1/16 to ½ inch. Although the exterior of the frame must be painted, the paint is not permitted inside any of the holes. Can you suggest methods for masking the holes to keep out the paint?* *B. E.*

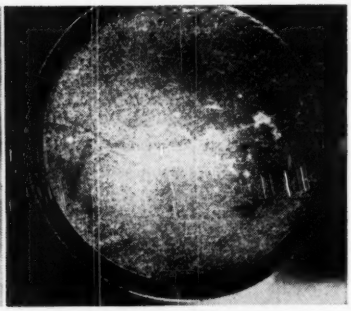
Answer. In the event that the frame is too large (and apparently it is too complex in shape) to use a metal spray mask, perhaps you could consider using: rubber plugs; rolled or coiled paper (treated or untreated); cardboard tubing or cardboard plugs. We are referring you to sources of information on products of this nature.

DO YOU HAVE A FINISHING PROBLEM?

The editorial staff of PRODUCTS FINISHING is prepared to aid you in the solution of your problem.
There is no charge for this service.



Macrograph of chromium plated steel rod, plated in ordinary solution for 16 hours. Deposit built-up to 0.016" on radius.



Plating in SRHS Solution, under identical conditions, built-up a 0.0225" deposit—over 40% more. Such speed cuts cost.

Are you taking advantage of these many ways to cut plating expenses?

Savings in time, labor, materials, and equipment are made possible with United Chromium's aid

A LEADER in the fight against high finishing costs is United Chromium which has developed many ways to make plating operations more efficient and profitable.

WAYS TO SAVE IN CHROMIUM PLATING

Chromium plating costs can be cut by *reducing* salts consumption, power needs, lost production time, rejects, and special racking procedures – and by *increasing* plating speed and tank load size.

All these methods of cost reduction are made possible through high-speed self-regulating chromium plating systems developed by United Chromium. Enthusiastic reports from the field say the SRHS systems not only save money but improve plating quality. They cut plating time up to half, minimize misses and burns, use economical concentrations, remain in top plating balance.

WAYS TO SAVE IN COPPER PLATING

Major opportunities for reducing copper plating expense lie in ending or simplifying buffing by depositing a more uniform plate. Reducing the need for treating of the plating wastes can also save. Faster plating helps, too.

New addition agents for use with Unichrome Pyrophosphate Copper have eliminated buffing for many users, made it easier for others who prefer to buff copper rather than base metal or subsequent deposits. Plating speed has been increased – by as much as 20% in some cases. Costs for waste disposal facilities are also being cut because the bath contains no cyanide.

WAYS TO SAVE ON NICKEL PLATING

Decreasing the rate of chromium rejects due to nickel passivity, reducing downtime for purification of nickel solutions, and using more stable addition agents

are important means for lowering bright nickel costs.

Unichrome Bright Nickel was developed especially for these characteristics. In 4 years of actual commercial operations, it has proved that its greater receptivity for chromium deposits, more stable addition agents, and exceptional tolerance for impurities do cut costs.

THE WAY TO SAVE ON ANODES

A chromium plating anode lasts longer when its entire surface is active – even that part facing the tank lining. This not only avoids costly corrosion, but also helps improve current distribution, reduce misplates.

Round shape provides greater anode activity.

A new development delivers such performance. Unichrome Round Anodes offer greater anode activity and therefore longer, more economical service. With cylindrical and more rigid design, they can end warpage problems and distribute current better.

THE WAY TO SAVE ON RACK COATINGS

Plastisol rack coating builds up substantial body and resiliency and offers longest service. Also easier and more economical to apply, it provides a positive means for lowering costs.

In its many years of use, Unichrome Coating 218X has established a remarkable record for economy. It defies all plating and cleaning solutions, even vapor degreasing cycles. It guards against solution contamination, won't chip, crack, blister or form pockets.

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Economy in chromate treating comes from using the process best suited to requirements of manual or automatic processing, size of production, equipment available, and type of finish.

With a complete line for treating zinc and cadmium offered by United Chromium for clear, black, olive drab, yellow and even brass colored finishes – the right process for the need can be found.

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For more information write your nearest United Chromium office.

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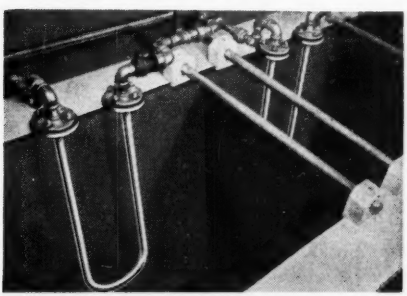
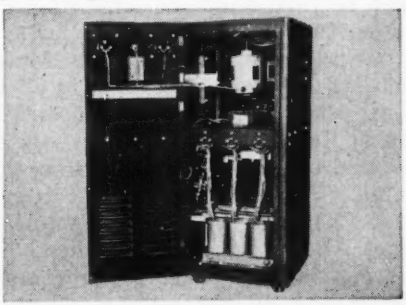


ECONOMY IN CURRENT SUPPLY. Interior of a Unichrome Rectifier gives good evidence of superior quality that assures dependable, economical power year after year.



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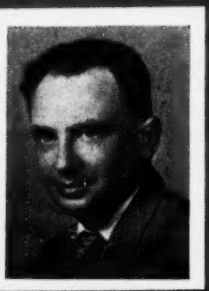
Spotlighting FINISHING Progress

Intermediate Coatings and Finishing Systems for Chromium Plate



Dr. Seymour Senderoff
Supervisory Chemist,
Electrodeposition Section
National Bureau of Standards

WITH the end of the Korean war and the relaxation of controls on nickel, the shortage of nickel for electroplating purposes has apparently changed from an acute condition to a chronic one. With the rapidly increasing use of nickel in ferrous and non-ferrous alloys, and allowing for the anticipated increases in production of the metal, it seems that nickel may be considered for some time to come, as one of the rarer metals as far as its use in electroplating is concerned. Hence, other finishes will have to be used in all applications where they will give satisfactory service, so that the nickel which is available can be used only in those applications where no suitable alternative exists or can be found.

J. Chadwick, in an article entitled "Finishes Alternative to Conventional Nickel—Chromium," in "Electroplating and Metal Finishing," *6*, 451 (1953), presents some interesting information with regard to a variety of substitute finishes which he studied. The conclusions are said to be based on the results of a 2½-year research program in

A Monthly Digest of Current Technical Progress Indicating Significant Trends and Developments in the Finishing Industry

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Alodized

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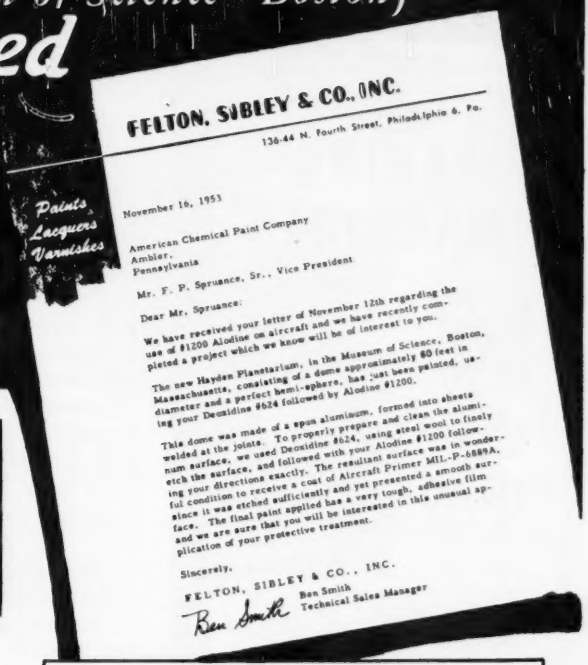

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136-44 N. Fourth Street, Philadelphia 6, Pa.

Paints Lacquers Varnishes

November 16, 1953

American Chemical Paint Company
Ambler,
Pennsylvania

Mr. F. P. Spruance, Sr., Vice President

Dear Mr. Spruance:

We have received your letter of November 12th regarding the use of #1200 Alodine on aircraft and we have recently completed a project which we know will be of interest to you.

The new Hayden Planetarium, in the Museum of Science, Boston, Massachusetts, consisting of a dome approximately 80 feet in diameter and a perfect hemi-sphere, has just been painted, using your Deoxidine #624 followed by Alodine #1200.

This dome was made of a spun aluminum, formed into sheets welded at the joints. To properly prepare and clean the aluminum surface, we used Deoxidine #624, using steel wool to finely etch the surface, and followed with your Alodine #1200 following your directions exactly. The resultant surface was in wonderful condition to receive a coat of Aircraft Primer MIL-P-6889A, since it was etched sufficiently and yet presented a smooth surface. The final paint applied has a very tough, adhesive film and we are sure that you will be interested in this unusual application of your protective treatment.

Sincerely,

FELTON, SIBLEY & CO., INC.

Ben Smith
Technical Sales Manager

WORK SPECIFICATIONS	
AREA TREATED	Aluminum dome
PRE-TREATMENT	"Alodine" No. 1200, applied by brush
PAINT	Felton Sibley DOME-LAC No. 20
CONTRACTOR	H. Newton Marshall Company, Inc., Boston, Mass.

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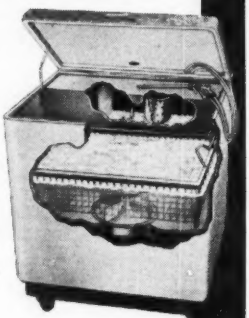

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which plated samples were exposed to marine, industrial, and indoor atmospheres. The standard for comparison, except where otherwise stated, was a 70/30 brass base plated with 0.0006 inch bright cobalt-nickel and 0.00002 inch chromium by standard methods.

Direct Chromium on Brass

It is well known that brass, plated directly with bright chromium by normal procedures (a temperature of 105 deg. F. and thickness of 0.00002 inch) corrodes very rapidly and increasing the thickness helps very little. Experiments have shown that the corrosion resistance of chromium is of a minimum when it is plated at 115 deg. F., and that it improves when the temperature of deposition is either raised or lowered. Experiments at low temperatures were not successful because, although the current efficiency was high, the deposits were so badly burnt that they could not be easily polished to full brightness. At higher temperatures, however, bright plates with good corrosion resistance could be obtained. With a solution containing 250 g/l chromic acid and 2.5 g/l sulfuric acid operated at 140 deg. F. and 400 amp./sq. ft., a deposit 0.00003 inch thick was obtained which was fully bright and had 2 to 2½ times the corrosion resistance of a similar chromium plate obtained by normal plating procedures.

At 150 deg. F. and 500 amp./sq. ft. a plate 0.00003 inch thick is obtained in 2½ minutes and has three times the corrosion resistance of the standard deposit. However, it requires light polishing to duplicate the normal color of chromium plate.

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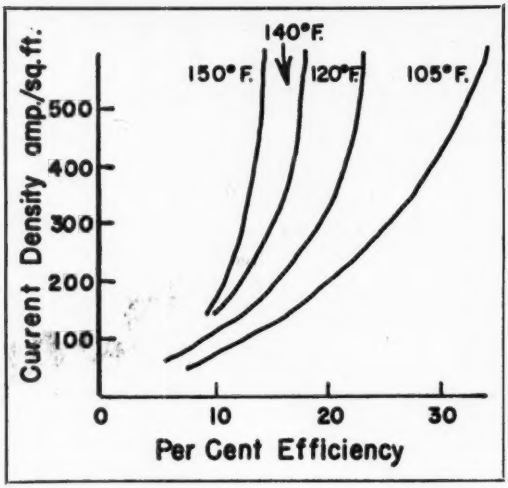

Fig. 1—Relationship between current density, current efficiency and temperature in chromium plating solutions.
(Illustration courtesy "Electroplating and Metal Finishing")

In Fig 1 is shown the relationship between current efficiency, current density, and temperature found by the author. The significant information derived from this data is that if the plating is bright, the current efficiency is about the same, whether the bright plate is obtained by a combination of low temperature with low current density or high temperature with high current density, within the range indicated in this graph. Hull cell tests (see Table I) show little variation in throwing power of the solution between 105 and 150 deg. Fahrenheit.

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ESTABLISHED 1856

Direct Chromium on Zinc Base Die Castings

Deposits were not bright but could be polished to full brightness. Corrosion resistance was poor.

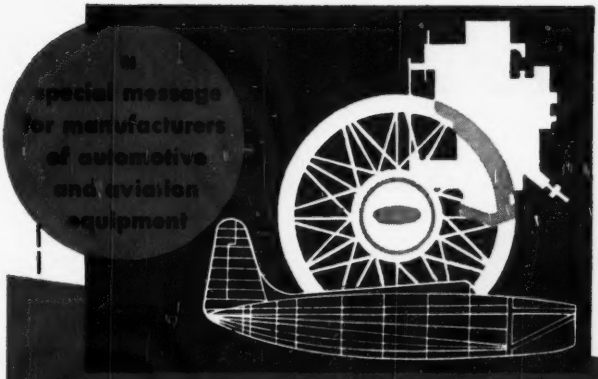
Direct Chromium on Steel

Steel parts plated with 0.00003 inch chromium by the high temperature method showed no rusting or loss of brightness after 12 months of indoor exposure, and only a few rust spots and no loss in brightness after 48 hours in the salt spray. The author considers high temperature chromium direct on steel as suitable for indoor use.

Chromium on Copper Plate*

Standard chromium plate over a copper plate 0.0007 inch thick or

* This and all plating combinations which follow are applied over a brass base.



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Here's a finish for non-ferrous parts that gives high corrosion protection, a firm and lasting base for paint or showroom sparkle . . . yet at low material and production costs. And, you can easily "Touch-up" scratches, repairs, welds, etc. on light metal parts! Here's Iridite . . . and here's how you can use it:

ON ZINC AND CADMIUM you can get highly corrosion resistant finishes to meet any military or civilian specifications and ranging in appearance from olive drab through sparkling bright and dyed colors.

ON COPPER . . . Iridite brightens copper, keeps it tarnish-free; also lets you drastically cut the cost of copper-chrome plating by reducing the need for buffing.

ON ALUMINUM Iridite gives you a choice of natural aluminum, a golden yellow or dye colored finishes. No special racks. No high temperatures. No long immersion. Process in bulk.

ON MAGNESIUM Iridite provides a highly protective film in deepening shades of brown. No boiling, elaborate cleaning or long immersions.

AND IRIDITE IS EASY TO APPLY. Goes on at room temperature by dip, brush or spray. No electrolysis. No special equipment. No exhausts. No specially trained operators. Single dip for basic coatings. Double dip for dye colors. The protective Iridite coating is not a superimposed film, cannot flake, chip or peel.

WANT TO KNOW MORE? We'll gladly treat samples or send you complete data. Write direct or call in your Iridite Field Engineer. He's listed under "Plating Supplies" in your classified telephone book.

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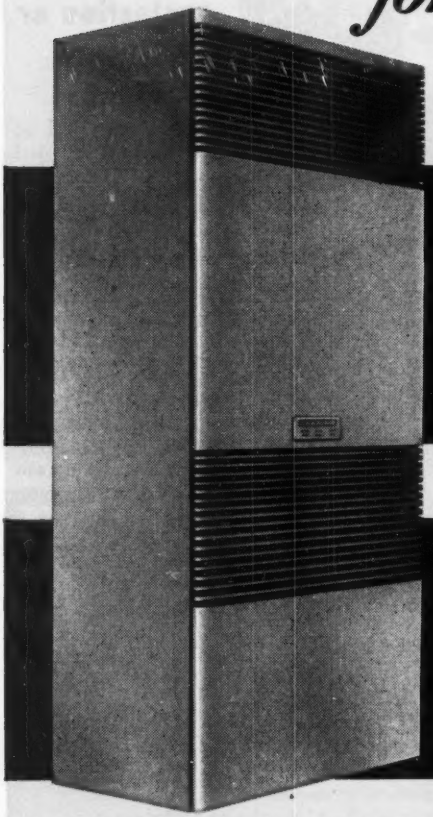
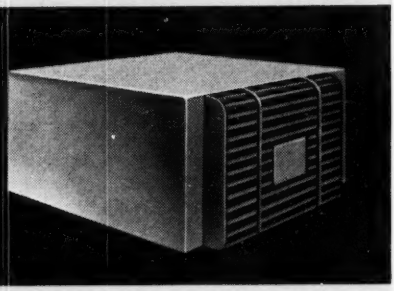
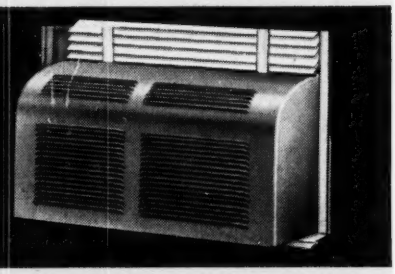
Specialized INDUSTRIAL for all types of keep them





Finishes with unusual moisture resistance safeguard sections that project outdoors.



Rugged, long-lasting finishes add to durability of interior sections.

The beauty of smooth enamels, hammered effect and wrinkle finishes contribute to eye appeal.

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Table I

HULL CELL TESTS ON CHROMIUM SOLUTION AT VARIOUS TEMPERATURES

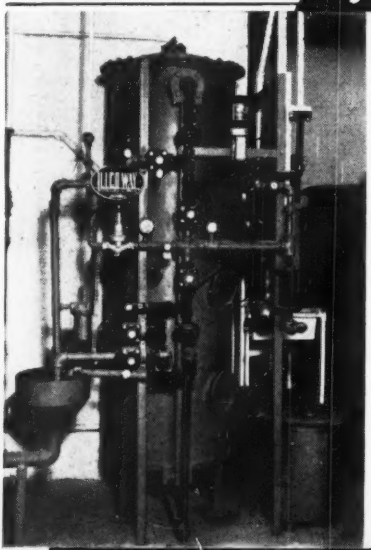
Solution Temperature (deg. F.)	Current (Amp.)	Bright Range of Deposit (Inch)
104	5	0.1 to 2.5
122	5	0 to 2.2
140	17.5	0.1 to 2.7
150	17.5	0 to 2.7

greater gives corrosion resistance which is superior to that given by direct chromium plating but definitely inferior to nickel-chromium coatings. Thinner copper deposits (0.0003 inch) are not quite as good but also yield improvement in corrosion resistance over direct chromium plates. The author notes, however, that when high temperature chromium is used over copper, the corrosion resistance is notably improved and is, in fact, almost equal to that of the standard nickel-chromium coating.

Chromium on Tin

Chromium could not be plated on tin except as a dull coating which could not be polished to full brightness without cutting through. No corrosion resistance data is given. The thickness of tin was 0.0005 inch.

Specify... Perma-Line



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MAXIMUM PROTECTION against chemicals, has been built in Perma-Line tanks of every size and shape. Among industries using Perma-Line tanks and linings are chemical plating, steel and wire, and sewage disposal plants, petroleum refineries, paper and pulp mills, etc.

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Barrel finishing boosts die maker's production 5000%

This almost unbelievable production increase was made by Callahan Can Machine Co., Inc., makers of bottle cap dies, when they switched to the HONITE Barrel Finishing Method. Too, per-unit labor costs for finishing were cut by a phenomenal 99.8% !

Dies are used to stamp out painted bottle caps. The problem was to remove sharp edges so that paint on the cap flanks would not be scratched. Former method of hand stoning each die resulted in low production with many rejects because hand stoning did not effectively round off the edges.

A HONITE barrel finishing machine, using SUPER-HONITE chips and the recommended HONITE compound was installed. Production jumped to several hundred pieces per day.

Dies came out perfectly uniform, quality was improved and the reject problem was eliminated completely!

Write 3M Company, Dept. PF-104, St. Paul 6, Minn. for FREE booklet "3M Barrel Finishing."

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Chromium on Tin/Zinc

The chromium deposit could not be polished to full brightness and exposure tests on the composite coating resulted in rapid failure with the formation of white corrosion products.

Chromium on Bright Zinc

Chromium over 0.0005 inch of zinc plate could be polished to a bright surface more easily than in the two previous cases, but exposure tests indicated rapid failure of the coating with the formation of white corrosion products.

Chromium on Speculum (Copper/Tin)

Both standard chromium and high temperature chromium were deposited over 0.0005 inch of Speculum plate. It was found that the high temperature chromium could, with difficulty, be polished to a bright surface when applied over Speculum, but that standard chromium could not be polished bright. The corrosion resistance of the high temperature chromium over Speculum plate was about equal to that of the standard nickel-chromium plate.

Tin/Zinc/Copper Alloy Deposit

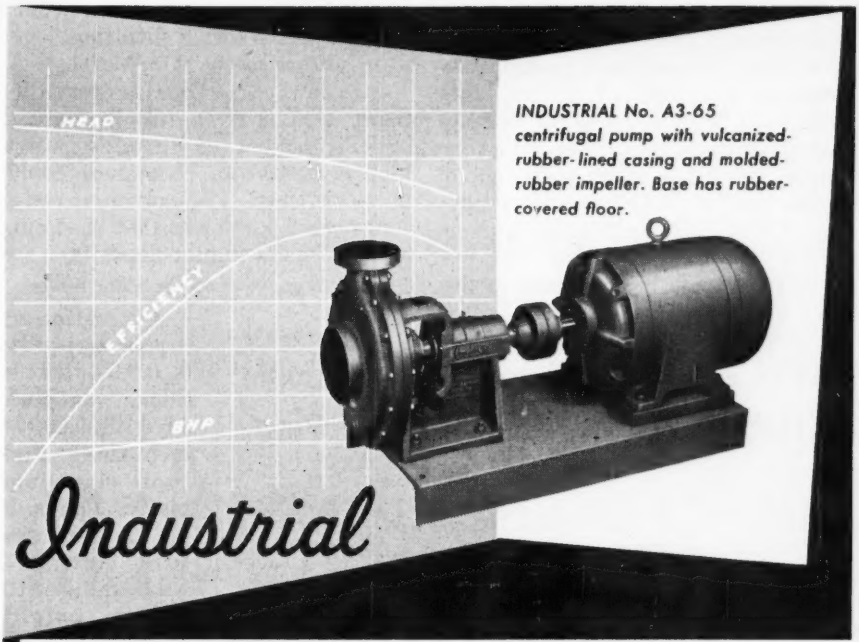
A bright deposit was obtained directly from the bath but corrosion resistance was very poor even with indoor exposure.

Chromium on Tin/Zinc/Copper Alloy Plate

The chromium deposit was very dull and could not be polished to full brightness.

Immersion Tin Deposit Alone and Under Chromium

The chromium could not be polished and the tin alone showed poor corrosion resistance.



INDUSTRIAL No. A3-65 centrifugal pump with vulcanized-rubber-lined casing and molded-rubber impeller. Base has rubber-covered floor.

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The latest in pump engineering and design is incorporated in INDUSTRIAL centrifugal pumps for maximum efficiency and severe, continuous service. Lined with soft rubber for abrasive slurries or hard rubber as specified, balanced rotating assembly mounted in ball bearings, corrosion-proof stuffing box to permit external liquid seal if required, easily removable packing gland nut and ample space for repacking stuffing box, simple adjustment of impeller clearance are some of the features.

These pumps are made in a range of sizes with capacities up to 240 gpm., operating heads up to 240 feet, and ¾ to 15 hp. They are furnished either with or without base, motor, and coupling.

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Tin/Nickel Deposit

A deposit, 0.0005 inch thick and containing 35 per cent nickel, was obtained semi-bright from the bath and could be polished to full brightness. Exposure tests showed the corrosion resistance to be about equal to standard nickel-chromium deposits. A few large pits did develop during exposure but these were believed to be due to inclusions in the plate which would have been avoided by better solution filtration.

Chromium on Tin/Nickel

Standard chromium was very difficult to polish to full brightness when plated over tin/nickel, but high temperature chromium could be so polished. The corrosion resistance was superior to that of standard nickel-chromium deposits.

Chromium on Copper Plus Silver

A polished copper deposit, 0.0004 inch thick, was plated with 0.00004 inch silver, and then chromium plated. The high temperature chromium was easier to polish bright than was the standard chromium. Exposure tests showed that this composite coating was equal in corrosion resistance to the standard nickel - chromium with standard chromium, and superior to it when high temperature chromium was used.

Chromium on Yellow Bronze

Yellow bronze deposits, 0.001

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inch thick and consisting of 90 per cent copper and 10 per cent tin were plated with both standard and high temperature chromium. The chromium deposits were obtained as bright plates when the tin content of the bronze was less than 14 per cent and when the bronze surface was introduced into the chromium bath with the current on. With standard chromium plate the corrosion resistance was better than copper-chromium coatings, but not as good as nickel-chromium coatings. With high temperature chromium the corrosion resistance was superior to standard nickel-chromium and to any other alternative tried. Similar results were obtained from corrosion tests on zinc die castings.

The author reaches the following conclusions:

1. Tin/nickel, chromium on copper plus silver, and high temperature chromium on Speculum give corrosion resistance equal to that of standard nickel-chromium.
2. High temperature chromium on tin/nickel, and high temperature chromium on yellow bronze give corrosion resistance superior to that of nickel-chromium.
3. Tin/nickel, and high temperature chromium on yellow bronze seem to be the most promising alternatives from economic considerations.

The nickel silver family of alloys contain no silver whatsoever, but are alloys of copper, nickel and zinc. They form tough and durable bases for plated flatware, such as knives, forks and spoons.

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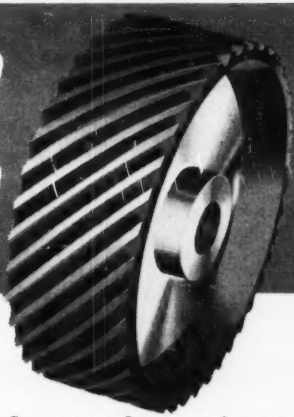

Chicago Rubber Company's amazing new R54 contact wheel cuts better—faster—longer and will substantially reduce your grinding and polishing costs 3 ways.

This precision machined and accurately balanced wheel is easily and quickly knocked down and reassembled for tire replacement or change.

- Replace only the rubber tire when necessary instead of the entire wheel.
- Choose from a complete assortment of tire treads for different grinding operations, still using the same wheel.
- And as usual Chicago Rubber Company's R54 contact wheel allows you to get the most wear from your abrasive belt—more than you ever got before.

There is a replaceable rubber tire with proper tread for every grinding requirement and in a wide variety of durometer ratings. Write for descriptive literature.

"IT'S THE WHEEL THAT DOES THE WORK"

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Main Office & Factory
2620 N. Clybourn Ave. Chicago
Makers of the COSMOWHEEL

ANNOUNCING . . .

a new LOW COST water wash spray booth by Binks

Check these 9 money-saving features:

1. **Fan stays cleaner longer.** Virtually all pigment is removed from exhaust air.
2. **Easy access.** Fan and arrestor plates are reached through doors in back of booth. When booth is installed against a wall, access doors are placed in front and lower section of water curtain is easily removed.
3. **No moisture reaches stacks.** Staggered metal arrestor plates trap moisture entrained in the exhaust air.
4. **Unbroken water curtain.** Binks special clog-proof Dynaprecipator manifold distributes water uniformly.
5. **Double washing.** Paint fumes and overspray must pass through 2 washings before they leave the booth.
6. **Stays clean longer.** The water curtain is constantly flushed.

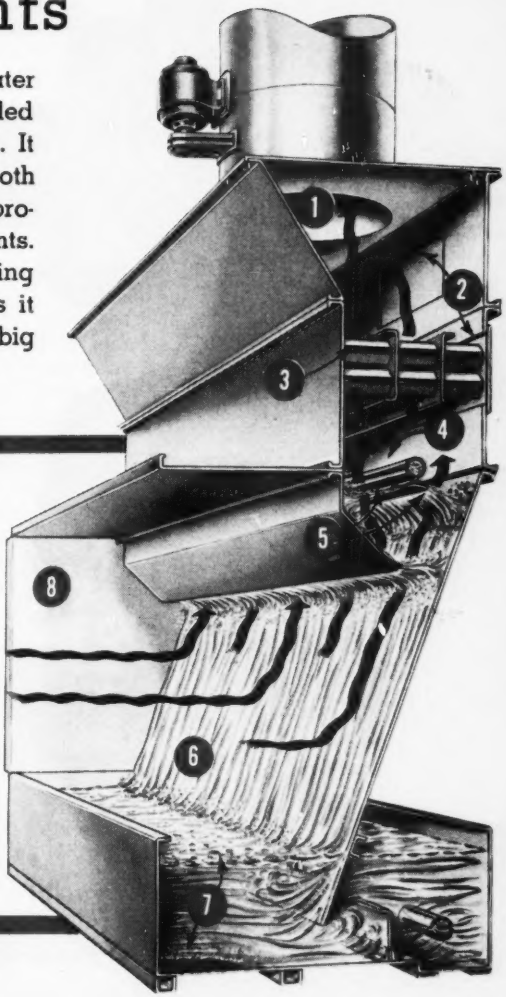
LET US ANALYZE YOUR NEEDS

Without obligation a Binks engineer will gladly call at your office to discuss the advantages of this new booth or to help you with spray painting problems of any kind. Just contact your nearest Binks office or write direct.

ASK ABOUT OUR SCHOOL. **A week of training in best finishing methods, equipment selection and maintenance. No charge for tuition. All welcome. Write for class dates and curriculum.**

Ideal for use in most plants

This new low-cost Style D water wash spray booth is recommended for normal industrial production. It supplements the Style DUC booth which is unequalled for heavy production and hard-to-handle paints. But the powerful double washing action of this new booth makes it ideal and fully approved for the big majority of spray painting installations.



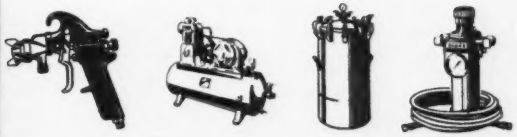
7 **Overspray reclaimed.** Overspray is washed into the water pan where it is trapped for easy removal or reclamation. This minimizes paint sludge reaching the circulating pump.

8 **Rigid, long-life construction.** Engineered to give long, trouble-free service.

9 **Economical.** Costs less, uses less electricity, occupies less floor space, requires less maintenance.

BINKS MANUFACTURING CO.
3118-40 Carroll Avenue
Chicago 12, Illinois

Binks



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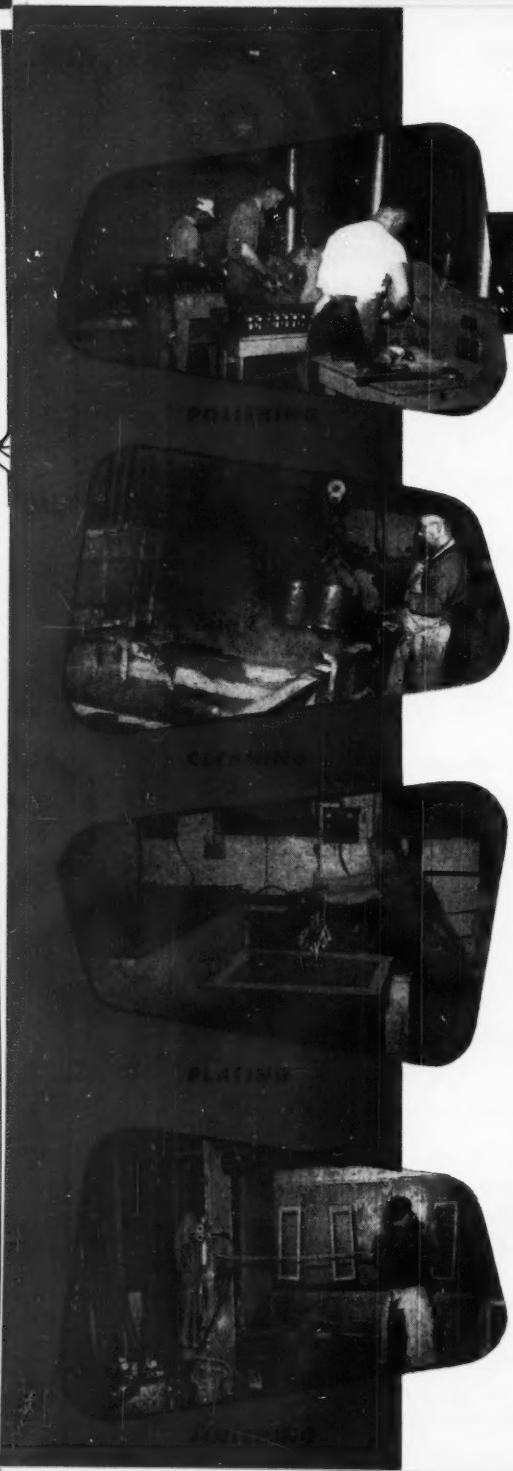


Reciprocating, Disc Type Paint Atomizer

A reciprocating, disc type atomizer —used with the Ransburg No. 2 Process of electrostatic spray painting— has been announced by Ransburg Electro-Coating Corp., Indianapolis, Indiana.

Although Ransburg has a number of stationary, disc type atomizers already in use in finishing departments in various plants, the reciprocating adaptation is a new feature of the firm's No. 2 Process. Now, with the up and down motion, the unit is said to provide the ultimate in uniformity in painting—not only of small parts, but big products such as refrigerator cabinets and doors.

The manufacturer states that simplicity, compactness, versatility, flexibility, ease of adjustment and maintenance are outstanding features of the reciprocating disc.

Parts are hung on a conveyor which makes a circular loop in the electrostatic spray area. The reciprocating disc atomizer is located in a pit in the floor (or mounted overhead) in the center of the loop. Paint is pumped to the center of the disc which rotates to feed paint to the atomizing edge. High d.c. voltage (usually around 90 K.V.) is imposed on the disc, establishing an electrostatic field between the disc and the parts hanging on the grounded conveyor. This atomizes the paint into a fine spray and electrostatically attracts it to the surrounding parts.

The reciprocating disc type atomiz-

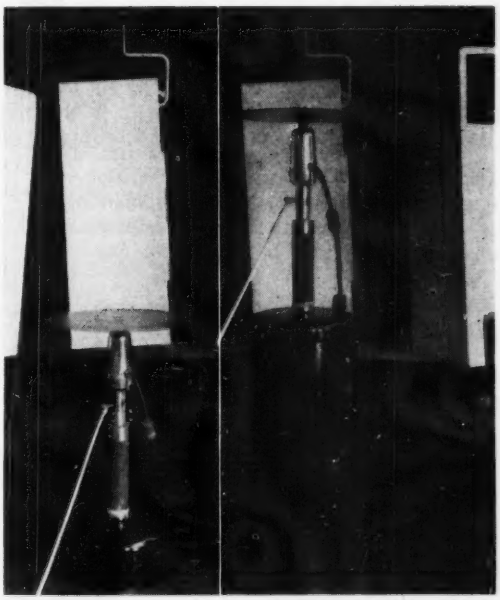
er does not require precise positioning of parts in relationship to the atomizer as in the Ransburg triple head unit. Tests show the reciprocating unit will tolerate a 10 to 24-inch difference with practically no spray pattern problem. A single 25-inch disc is capable of atomizing five times as much paint as one atomizing bell of a Ransburg triple head unit.

The reciprocating disc permits the application of a heavy, uniform coating with one pass in the electrostatic spray area. With refrigerator whites, up to 2 mils are applied with one loop in the paint area.

Different reciprocating speeds may be automatically controlled within the stroke. For instance, in the coating of metal chairs, where less paint is required to coat the legs, movement may be automatically stepped up. And, where more paint is required to cover larger surfaces, such as back rests, the action is slowed down, permitting application of more paint.

Within broad limits, various sizes of parts may be painted indiscriminately. For instance, refrigerator sizes varying from 55 to 66 inches in height and from 24 to 30½ inches in widths may be painted with excellent uniformity. Too, in handling parts of various vertical dimensions it is easy to change the length of the stroke "on the fly" without slowing up production. Changes can be made by merely pressing a button without shutting down the production line.

Major appliance manufacturers are



Refrigerator doors and cabinets make a circular loop around the Ransburg reciprocating disc atomizer located in a pit in the center of the conveyor loop. The single, 25-inch disc is capable of atomizing five times as much paint as one atomizing bell of a Ransburg triple head unit. Cylinder is shown (left) near the bottom of the stroke, and (right) near the top of the stroke.

especially interested in the new development. The equipment has been demonstrated before engineering groups representing leading refrigerator and home laundry equipment manufacturers. First big manufacturer to put the equipment to work is General Electric, who soon will have eight reciprocating discs painting refrigerators in prime and finish on two lines at Appliance Park, Louisville, Kentucky.

Other parts already successfully painted in Ransburg laboratories with the No. 2 Process reciprocating disc include: bridge tables and chairs, water heater jackets, automobile hoods and fenders and window trim parts, wire screen, air filters, furnace panels and grilles, ventilating fans, washing machines and dryers, gate valves, shower stalls, toy wagons, fluorescent fixtures, steel drums, inner door liners for refrigerators, and school desks.

For further data circle No. 1 on Reader Service Card inside back cover.

Model 52-100 Polishing and Buffing Head

Polishing and Buffing Head

Hammond Machinery Builders, Inc., 1622 Douglas Ave., Kalamazoo, Michigan, has announced the development of a heavy-duty, full-floating, adjustable polishing and buffing head and stand unit. Designated as Model 52-100, the unit will accommodate either a 10 or 15 h.p., 1750 r.p.m. or a 20 h.p. 3500 r.p.m. motor.

The unit weighs 2500 pounds, an indication of the rugged construction required for accomplishing heavy buffing jobs with a minimum of vibration. The polishing and buffing head has a maximum "float" of 6 inches, and can be furnished with power feed for vertical lift or horizontal traverse.

Model 52-100 Head Unit, which can be assembled for either right or left hand operation, was designed especially for use with Strait-Line Automatic Buffing Machines. It can also be used with Rotary Automatics or as an individual polishing and buffing stand.

For further data circle No. 2 on Reader Service Card inside back cover.

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Stop-Off for Metallizing

The Park Chemical Company of Detroit has developed "Metal Stop" a new product designed to be used to protect certain metal areas during metallizing operations.

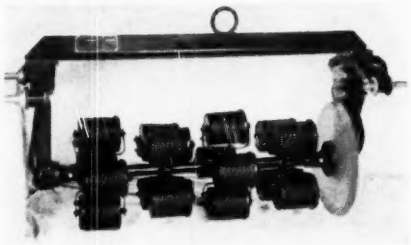
Metal Stop has a distinct gray-white color which readily shows up the part area to be protected. Its edge aligning is very sharp and it is a fast drying paint. Brushing is made easier with Metal Stop because of its free flowing characteristics, and because it is water soluble, brush cleaning is no problem. It provides a smooth, even coating, is easy to apply, easy to clean up, and leaves no streaks or unprotected areas, the manufacturer states.

For further data circle No. 3 on Reader Service Card inside back cover.

Cluster Plating Barrel

One of the largest manufacturers of computing machines asked The Udylite Corporation, Detroit 11, Mich., for advice and assistance in solving a plating problem inherent in the office machinery business.

These manufacturers plate millions of small parts and types which cannot be mixed. This means plating always in small, well separated batches, yet on a large production scale.



Udylite Cluster Plating Barrel

To solve the problem, Udylite barrel plating engineers developed the "Udylite Cluster Barrel," which provides a rotary rack to hold small containers with the proper, constant current conducted to each container. The mechanism consists of a shaft rotated by means of a large ring gear. On the shaft are mounted, at intervals of about eight inches, four spoke arrangements. Each spoke carries a perforated steel, plastisol covered container held in place by "C" shaped spring clips which also serve to hold the removable lid in place.

For loading and unloading, the small containers are easily snapped out of the clips and the lids are simply lifted off the containers. Each container has a built-in disc type cathode contact making it a complete unit.

The Udylite Cluster Barrel with its bail type superstructure can be used

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DO YOU HAVE A DIFFICULT PART TO PLATE?
Take your problems to Udylite. We have a pilot plant where we will check your plating problem and make recommendations. It will save you from future costly mistakes. This service is free! Write to—
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Kimwipes 1300 are soft, strong and absorbent. A full 12″ x 18″, they hold up to 8 times their own weight in liquids. They're non-abrasive, too. There's no holdover of metal chips or other infectious materials that cause dermatitis. New 1300 Kimwipes are absolutely clean to start with and are disposed of after use. Ask your salesman for samples, today!

Kimberly Clark
INDUSTRIAL WIPERS
Kimwipes

Kimberly-Clark Corporation • Neenah, Wis.

in the standard plating barrel.

It is said to be well adapted to the plating of business machine, radio, radar parts or any such products that must be kept separate during plating. It is also of use to anyone plating small delicate parts.

For further data circle No. 4 on Reader Service Card inside back cover.

Automatic Traveling Spray Booth

Automation in spray painting for transportation equipment is the newest development of the DeVilbiss Company, Toledo, Ohio, manufacturer of spray painting equipment.

The Great Northern Railway Company is the first in the nation to install a DeVilbiss automatic traveling spray booth designed expressly for the spray painting of freight cars. The booth is located at the railroad's St. Cloud, Minnesota, shops.

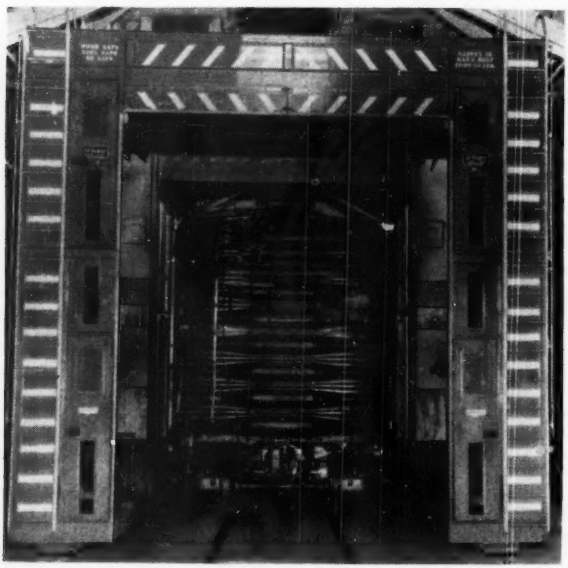
Traveling booths made by DeVilbiss have achieved a reputation for outstanding performance in railroad and transit fields during the last few years. These regular booths have been in use for the refinishing of rolling stock and have helped increase efficiency and speed in painting.

The new automatic booth operates somewhat like these others but the difference is in the replacement of hand spraying with the installation of automatic transverse coating machines on the sides and a gang arrangement of automatic spray guns on the top of the unit.

At Great Northern, four freight cars are placed in the painting position and the workmen actuate the booth. Each car receives two coats of paint on both sides and one on the roof. The ends of the cars are hand sprayed by workmen using extension spray guns. These workmen, who ride inside the traveling booth, stop at each spot where car ends are sprayed. The complete cycle takes 48 minutes, or 12 minutes per car.

The new automatic traveling booth has controls within easy reach of the operator and is equipped with inside platforms which can be raised or lowered to enable the operator to efficiently spray the ends of the cars.

The booth, a self contained painting



Automatic Traveling Spray Booth

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Metal Phosphating Chemical

Currently Used On:

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TO USE SURPHOS:

. . . dissolve in hot water to a concentration of one ounce per gallon and apply to metal by dipping or spraying in a power washing machine. Acid proof equipment not needed.

SURPHOS *Conditions Metal For Painting:*

- **CLEANS**
- **FORMS PHOSPHATE COATING**
- **PREVENTS RUSTING**
- **IMPROVES ADHESION of PAINT**
- **INCREASES HUMIDITY and SALT-SPRAY**
- **RESISTANCE OF PAINT**

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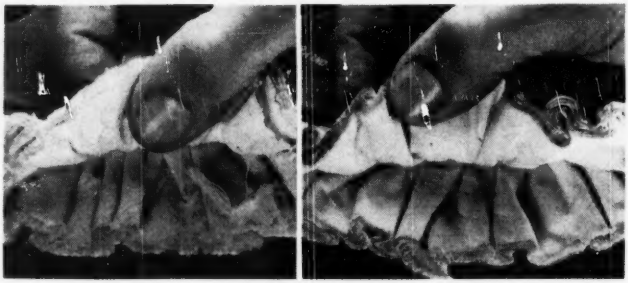
In Canada made and sold by Boyle Chemicals Ltd., Longbranch, Ont.



These two buffs, one Binderized and the other untreated, were run under identical conditions. The untreated buff (left) contains many holes and worn spots—the result of internal frictional wear. The H-VW-M Binderized buff (right) is undamaged as lubrication provided by the binderizing process greatly reduces frictional wear.

unit, is equipped with its own compressors, air transformers and a circulating system which has a capacity up to 110 gallons of paint. In addition there are many safety factors including a CO-2 system.

For further data circle No. 5 on Reader Service Card inside back cover.

Impregnated Buff

An improved metal finishing buffing wheel, announced by Hanson-Van Winkle-Munning Co., is stated to cut faster than former company models and wear 30 per cent longer.

Called a "Binderized Ruff-L-Buff," the new buff is impregnated with the same organic material that is used as a binder in buffing compounds. The cloth in H-VW-M's standard line of Ruff-L-Buffs is not impregnated, and the two lines differ in this respect.

Forming a natural bond between buff and cutting compound, the impregnated "binder" permits thread ends to retain the compound more easily, more quickly and in larger quantity. The more compound carried, the less frequently are additional applications required, and the faster the cut under all conditions.

Grease-like in nature, the binder also tends to make the buff softer and more flexible during operation.

Helping to hold frictional heat down is the self-ventilating design feature of the Ruff-L-Buff. The individual buffs have six holes punched in their fibre-board centers and 12 air channels stamped on the outer rim of the centers. During operation, air is force-circulated over the numerous ruffles of the buff.

Cloth used in these buffs is cut on the bias to prevent unravelling and to

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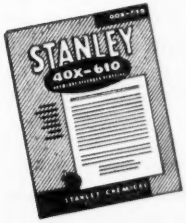
Weatherproofs in ONE OPERATION

Stanley 40X-610 one-package WASH-PRIMER

Now steel or iron parts can keep the weather at bay throughout a year of outdoor storage without topcoating. Reason: Stanley 40X-610. This one-package, one-operation wash primer for spraying, brushing, or dipping forms a weather-tight skin that lasts. Its resistance to corrosion and rust creep is excellent. And Stanley 40X-610 may be used with most topcoats. Find out more about this low-cost, easy-to-apply outdoor protection . . . write today for the new bulletin on Stanley 40X-610 to: Stanley Chemical Company, 31 Berlin Street, East Berlin, Connecticut.



LACQUERS

JAPANS

SYNTHETICS

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STANLEY CHEMICAL

provide more area and better adherence for the cutting compound. Other features of the buff are: perfect balance for uniform rotation and wear, steel-ring anchor to secure the cloth to the fibre-board center and exclusive Red-E-To-Use face that takes compound without the customary surface preparation.

Binderized Ruff-L-Buffs are available in a wide variety of plys and weights with outside diameters of 12, 14, 16, and 18 inches. Non-standard sizes may be had on request.

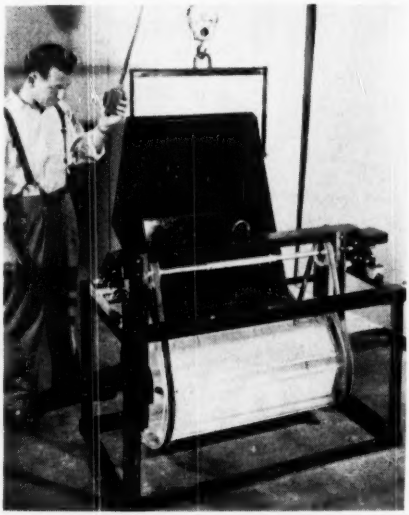
For further information write to Oscar Davison, Hanson-Van Winkle-Munning Co., Matawan, N. J., or circle No. 6 on Reader Service Card inside back cover.

Plating Barrel Loader

Newest accessory developed for the recently introduced Gill-Singleton Plating Barrel, is a handy, semi-automatic loading chute and cylinder support stand now offered by The G. S. Equipment Company, 5317 St. Clair Avenue, Cleveland, Ohio.

Primarily designed for Gill-Singleton Barrels, it is manufactured in various sizes to fit all makes of cylinders and superstructures.

Simplicity of operation, versatility and rugged all-welded construction



Gill-Singleton Plating Barrel Loader

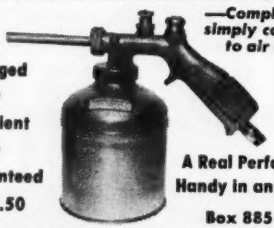
are featured. The receiving end of the chute is flush with floor level for easier loading of materials to be cleaned or plated. It operates with any type hoist, and is quickly attached to the hook at waist height without stooping. It tilts as it lifts, discharging a full load into the cylinder in one operation.

The plastisol-coated lip prevents injury to cylinders.

For further data circle No. 7 on Reader Service Card inside back cover.

Portable Sandblast Gun

—Complete— simply connect to air line



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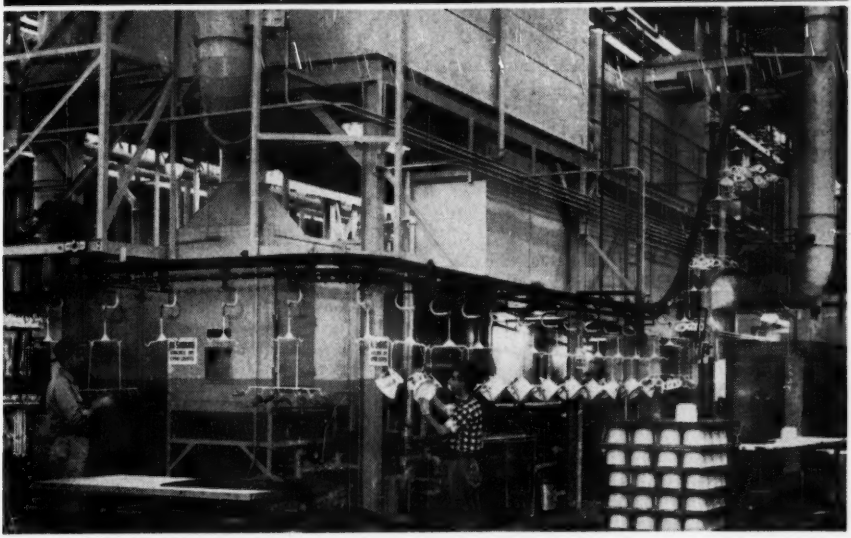

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"PRODUCTION DIVIDENDS"

KOCH's "sole responsibility" for your complete finishing system assures expert engineering from layout through installation; perfect "dove-tailing" of components that prevents costly delays and last-minute changes.

The result is a system that operates at peak efficiency and lowest possible unit cost. These "production dividends" you declare for yourself the day you call in a KOCH engineer.

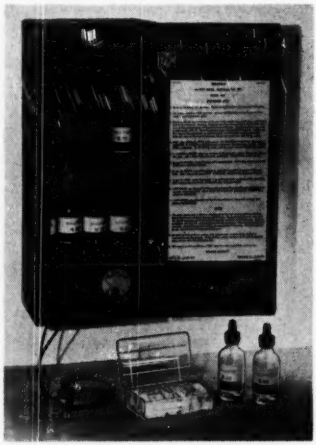
WRITE FOR FOLDER 21!

GEORGE KOCH SONS, INC.

EVANSVILLE, INDIANA

High-Temperature Strippable Masking Material

Better Finishes & Coatings, Inc., Newark, N. J., has developed a masking material that is said to be freely strippable after baking at 400 deg. F. for 15 minutes. This strip coating is excellently adapted to finishing operations where it is necessary to mask off certain areas prior to applying baking enamels. The manufacturer recommends spray or brush applications to produce a film thickness of approximately 4 mils. Technical data and samples may be obtained from Better Finishes & Coatings, Inc., 268 Doremus Avenue, Newark 5, New Jersey.



Kocour Identification Set Model PIA

Plating Identification Kit

The Kocour Identification Set Model PIA is used to positively identify and differentiate between metallic deposits. Tests are provided for identifying cadmium, tin, silver, lead, nickel, chromium, zinc and presence or absence of chromate conversion coatings. The set is complete and includes all of the necessary solutions in stopper and dropper bottles, contact papers and a panel with meter, on-off switch, batteries and leads with probe and clip all enclosed in a wall type cabinet.

The Cadmium Identification Set is also available for those interested in differentiating between cadmium and zinc only. This economical set is packed in a handy two-tray box.

Write for literature to Kocour Company, 4814 S. St. Louis Avenue, Chicago 32, Ill., or circle No. 8 on Reader Service Card inside back cover.

Stripper for Resistant Finishes

"Strypp-Away," a new, modern heavy duty, liquid stripper to remove tough, modern finishes like Epons and

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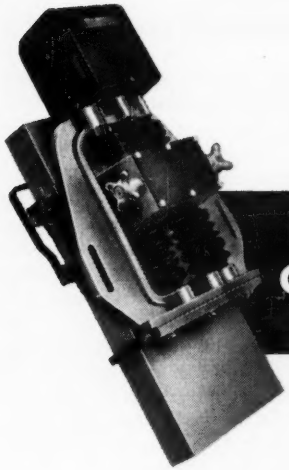

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A NANKERVIS COMPOUND APPLICATOR FOR 10-INCH BARS

and it's Automatic!

Buffing l-a-r-g-e parts? Then here's a product to help you get better results, cut costs as well.

It's the new Nankervis Automatic Compound Applicator. Called the Model 610, the new applicator accommodates any cake up to 10 inches wide (2"x10"x24").

It is automatic in operation and is similar in construction to other models in the "600" Series. Air operated, it weighs forty pounds and can be installed on all types of buffing machines. All moving parts are bearing mounted to insure smooth operation and long life. Protective boots of molded Neoprene seal out all dirt, dust, lint and compound from the operating mechanisms.

Nankervis "600" Series Applicators can be operated from any air supply line equipped with a 3-way exhaust valve. This valve can be mechanically, electrically, or manually-operated depending on the buffing operation involved and the amount of compound desired. Each time the air valve is operated, the cake holder is thrust forward applying compound to the buff. The cake holder retracts, when the valve is released, pulling the compound away from the buff. Each time the cake holder is thrust forward, its relative position is advanced to compensate for wearing of the bar. This feed rate is adjustable from .0015" to .015" per stroke. (No 3-way valve is supplied as the choice of this component is dependent on the buffing operation involved.)

Instructions for installing, operating, and maintaining the applicator are included with each unit.

For Additional Information on This and Other Nankervis Applicators Write for Nankervis Technical Bulletin No. 600.

GEORGE L. Nankervis COMPANY 19255 W. DAVISON AVE. • DETROIT 23, MICHIGAN

EQUIPMENT AND SUPPLIES FOR THE METAL-FINISHING INDUSTRY

other chemically resistant finishes is now being marketed by The Du Bois Company, Cincinnati and Los Angeles, manufacturer of chemical cleaning compounds for industry.

Strypp-Away may be used directly from the container or diluted with water depending on the job to be done. It will hold up for long periods of heating without loss of strength and may be used at temperatures as high as 220 deg. Fahrenheit.

In a recent demonstration of Strypp-Away's effectiveness DuBois showed how Strypp-Away (operated at 200 deg. F.) completely removed an Epon varnish in 15 minutes.

For further data circle No. 9 on Reader Service Card inside back cover.

Spray Cleaning Machine

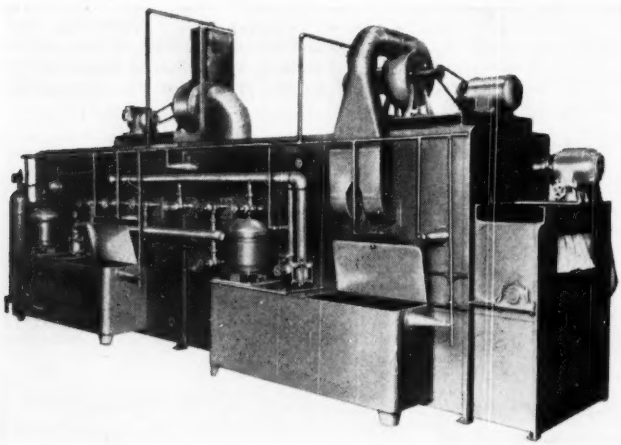
A cleaning machine using low-flash petroleum type cleaning solvents has been designed, engineered and built by The Alvey-Ferguson Company, Cincinnati 9, Ohio, for a large bearing manufacturer to remove grinding residue and shop dirt from precision ball bearing parts before assembly.

The bearing parts, carried through the machine in baskets on a power driven roller conveyor, pass through a three-phase cleaning process; two washing operations and a blowoff to remove excess solvent. A petroleum type solvent is used to prevent rust before, and during, final assembly.

Like all other A-F Cleaning Machines, this model employs an A-F Super-Spray cleansing system. The bearing parts pass through consecutive high-pressure, fan shaped curtains of low-flash petroleum type solvent. Both emulsion and alkali cleaning solutions can be used in this machine. Solvent filtration is accomplished by a screen tank having two independent screens enabling one screen to be removed for cleaning without interrupting the cleaning operation.

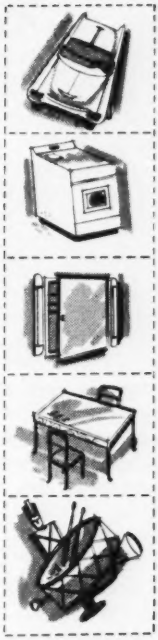
An automatic fire extinguishing and fire control system is standard equipment when machine is designed for use with petroleum type solvents. The entire system is activated by a sudden temperature rise in the machine. Internally, the machine is equipped with an automatic CO_2 Fog system; fire control is accomplished by an automatic closing of duct dampers and fan shutoff.

For more information write: The Alvey - Ferguson Company, 1176 Disney Street, Cincinnati 9, Ohio, or circle No. 10 on Reader Service Card inside back cover.



Spray Cleaning Machine for bearings

LESSON IN STAYING PUT



and Bonderite Makes Paint Stay Put on Metal

Paint doesn't stay put when applied to raw metal surfaces. But the same metal, treated with Bonderite, holds paint firmly.

Bonderite, Parker's corrosion resistant paint base, creates a tight phosphate coating, integral with the treated metal. The smooth, even coating provides a firm anchor for paint, resists corrosion and stops the spread of rust around scratches and breaks in the painted surface.

Literally thousands of metal products on the market today are protected with Bonderite. Automobiles, household appliances, business machines, metal furniture, electrical equipment, toys, and sewing machines are among the products treated with Bonderite. And their fine finishes last longer because of it.

Your painted metal products should have the added value, the added sales appeal, of Bonderite under the paint. Write today for full information!

*Bonderite—Reg. U.S. Pat. Off.

Since 1915—leader in the field

PARKER RUST PROOF COMPANY

2172 E. Milwaukee, Detroit 11, Michigan

BONDERITE corrosion resistant paint base

BONDERITE and BONDERLUBE aids in cold forming of metals

PARCO COMPOUND rust resistant

PARCO LUBRITE wear resistant for friction surfaces

Phosphate Cleaner

The Neilson Chemical Company, 6561 Benson Street, Detroit, Michigan, has announced the introduction of "Phosteem," a product and process for cleaning and phosphatizing metal surfaces prior to painting.

The manufacturer states that this product and process has been developed over several years and has proved itself to be a very efficient, simple and effective method of simultaneously cleaning and phosphatizing metal surfaces for paint finishing. It is equally effective on ferrous metals, aluminum alloys, zinc coated surfaces and may generally be applied to almost any type of metal alloy which is to be painted.

The plant space required for the Phosteem process is very small and the process can be used in almost any convenient section of the plant.

Where manufacturers have installed power spray parts washers which are too small for their special production, or their regular production is in excess of what their power parts washers can handle, the Phosteem process makes it possible to take care of the cleaning and preparation of the surplus production for painting easily and economically.

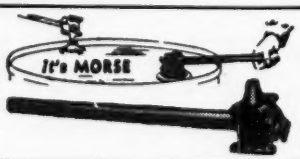
Send for Phosteem literature, Form 54-122-K11, or circle No. 11 on Reader Service Card inside back cover.

Barrel Nickel Brightener

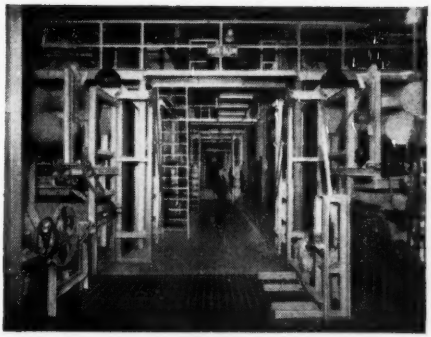
A 30 to 100 per cent increase in the corrosion resistance of barrel nickel plated steel parts was recently shown in a series of tests of an improved formula of Nickelite brightener. The tests were conducted under standard salt-fog conditions by the manufacturer of the brightening agent, Platers Research Corp., New York. Comparison of parts plated in solutions containing the brightener with parts plated in standard nickel solutions resulted in improved corrosion resistance of 30 per cent for minimum deposits of nickel, and up to 100 per cent for thicker deposits. Coupled with this improvement, according to the manufacturer, is the elimination of the usual brittleness of nickel finishes, and an accompanying attainment of maximum brilliance of the surface.

As a result of the tests, the improved Nickelite has been prepared for national distribution with special emphasis on economy. The product is now packaged in quadruple-strength concentrate in quart bottles, to eliminate the necessity to ship and handle

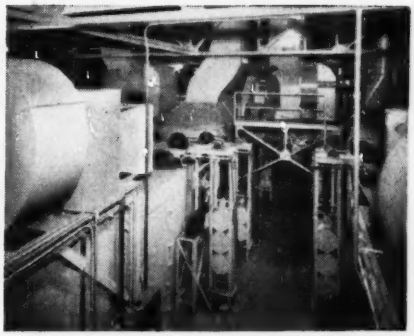
UDYLITE SERVICE
DOESN'T COST—IT PAYS
These are cost cutting days—and it will pay you to investigate Udylite's free services to the plating industry.
OUR FIELD SERVICE STAFF IS LARGE
In fact, largest in the electroplating field. That means you get frequent service check-ups. We maintain Udylite equipment at top performance.
It's all free, of course. Just another plus when you buy from Udylite.
WORLD'S LARGEST PLATING SUPPLIER
THE Udylite CORPORATION
DETROIT 11, MICHIGAN

Send NOW for this FIT-ALL
DRUM PLUG WRENCH
Instantly loosens, tightens 95% all plugs or bungs in steel drums. Has 16" extra-strong steel tubing handle. Wgt. only 2 lbs.
Order 1 or more today!


THOUSANDS IN USE saving time, labor, accidents!
SATISFACTION GUARANTEED.... $3.30
Non-sparking type $5.10
Plus Parcel Post
MORSE MFG. CO., Inc.
762 W. Manlius St., E. Syracuse, N. Y.



Rock Wool Batt Production; fibres are formed into batts, compressed to proper density and baked.



Air Heating and Handling Equipment; ovens are gas-heated, atmospheric air used for cooling.

KIRK AND BLUM

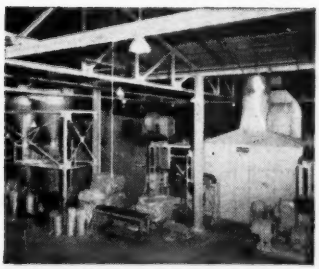
TWIN OVENS AND COOLING TUNNELS SPEED ROCK WOOL PRODUCTION

...at Philip Carey Mfg. Co., Cincinnati, Ohio

Recently installed at this noted insulation and building products manufacturer, twin KIRK & BLUM Ovens have increased rock wool production and assured continuous operation.

These specially designed three-temperature zone ovens bake the batts, setting the binder solution, and are individually adjustable for batts of varying thickness and density. Closed circuit cooling tunnels, handling 50,000 CFM of air each, completely cool the batts before packaging.

Whatever your needs in ovens...for drying, baking or dehydrating . . . consult KIRK & BLUM. There's no obligation. Write for booklet, "Industrial Ovens," showing other typical installations.



Dual Rock Wool Processing Lines; Ovens in left background and cooling tunnels at right. In left foreground is rock wool granule reclamation; particles are collected and bagged.

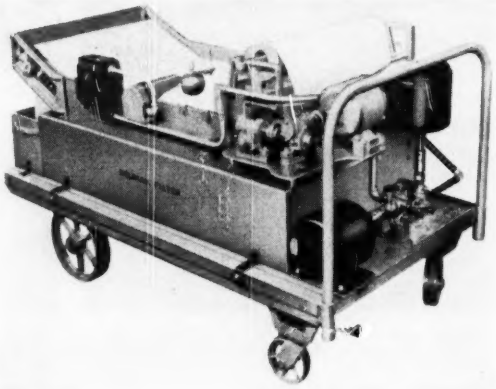
FOR CLEAN AIR . . . THE INVISIBLE TOOL

KIRK AND BLUM

INDUSTRIAL OVENS

The KIRK & BLUM Mfg. Co. **3116 Forrer St., Cincinnati 9, Ohio**

Delpark Portable Filtration Unit



carboys or other large containers.

The new bottle is provided with a no-drip lip to facilitate the use of the brightener concentrate, which can be measured in the bottle cap for addition directly to the plating solution. The user can also dilute the concentrate with water to make a normal-strength solution before addition to the plating tank.

For further data circle No. 12 on Reader Service Card inside back cover.

Portable Filtration Unit

A portable filtration unit incorporating the Delpark disposable belt-type filter has been announced by the Industrial Filtration Company, Lebanon, Indiana.

This unit, mounted on casters, is easily transported for periodic filtration of various liquids and oils which do not require continuous filtration. These units make use of a variety of filter media for numerous filtration requirements and may be used on quenching oils, cutting oils, and many other industrial applications. The Delpark filter is known for its principle of continuous and automatic filtration.

For further information write to George L. Guymon, vice president, Industrial Filtration Company, Dept. P-312, Lebanon, Ind., or circle No. 13 on Reader Service Card inside back cover.

UDYLITE SERVICE DOESN'T COST—IT PAYS

Udylite service begins with your first inquiry and continues as long as you need it. You are *not forgotten* after the sale. Udylite metal finishing "know-how" is always available at your request . . . and it makes no difference if your operation is large or small.

When you buy from Udylite you get "More Than A Pound." Udylite gives you these 6 important helps beyond outstanding equipment and tested supplies at no extra cost.

- A pilot plant where we check new plating problems and make recommendations.
- A Customer Laboratory for the testing of your solutions.
- Electrical Service for the latest in current usage recommendations.
- Field Service men who are regularly checking Udylite equipment now operating throughout the United States.
- Engineering Service to advise you regarding the best equipment to handle your new jobs.
- The new Udylite Research Corporation continually working to develop a new and better way of plating.

Call us in on any plating problem. Get these Udylite "More Than A Pound" services without cost or obligation.

THE Udylite CORPORATION DETROIT 11, MICHIGAN

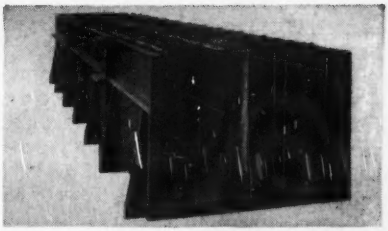
WORLD'S LARGEST PLATING SUPPLIER

Pre-phosphatizing Metal Cleaner

Development of a pre-phosphatizing metal cleaner to be used in mechanical spray processing equipment, which is relatively neutral and contains no metallic activator, has been announced by the Detrex Corporation, Detroit 32, Mich., producer of industrial chemi-

● A true advancement in electroplating, ARco Diaphragm Systems have created a new standard in plating quality. Simply installed, Diaphragm Systems segregate anolyte from catholyte through canvas barriers between anode and cathode. This electroplating method, combined with ARco Rubber Lined Tanks and planned solution circulation, filters metallic insolubles from outside sources.

Reduce costly buffing due to roughness . . . prevent rejects because of thin spots . . . have ARco engineers show you how Diaphragm Systems can save time, materials . . . and customers.



● ARco Two Work Lane Diaphragm Plating Tank

● ARco Horizontal Diaphragm Installation

For uniformly high quality and economy in plating...

DIAPHRAGM SYSTEMS *and* RUBBER LINED TANKS

by ARco

AUTOMOTIVE RUBBER CO., INC.

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Manufacturers • Designers • Engineers

●

ARco RUBBER PROCESSORS
4033 Homestead Road
Houston • Texas

ARco Vertical Diaphragm Installation

ARco Diaphragm Plating Tank, return bend type

AUTOMOTIVE RUBBER CO., INC.
12564 Beech Rd., Detroit 39, Mich.

Please rush me _____ copies of your "Diaphragm Tanks Promote Plating Progress."

Name_____

Firm_____

Street_____

City_____ State_____

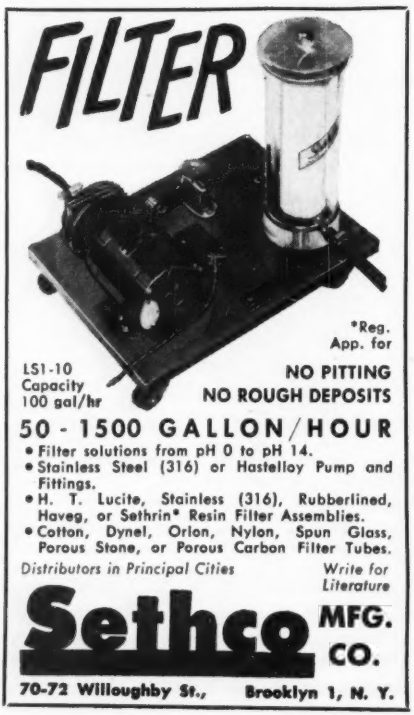
cals and metal cleaning equipment.

"Detrex 771 Paintbond Cleaner" was specifically designed for use in spray phosphate coating units where a fine-grained phosphate crystal is required. By accomplishing the activating process without resorting to metallic activators, Detrex 771 leaves the metal surface chemically clean and requires no surface seeding in the pre-phosphate coating stages.

Subsequent phosphate coatings are extremely fine grained, uniformly coated and, thereby, result in lower chemical consumption, according to L. Camel, sales manager of the Detrex Chemical Processing Division.

In its formulation, Detrex 771 Paintbond cleaner has been designed to prevent excessive foaming at elevated temperatures and pressures. Field tests indicate that, in operation, the cleaner is quite economical.

For further data circle No. 14 on Reader Service Card inside back cover.


FILTER
*Reg. App. for
LS1-10
Capacity
100 gal/hr
NO PITTING
NO ROUGH DEPOSITS
50 - 1500 GALLON/HOUR
• Filter solutions from pH 0 to pH 14.
• Stainless Steel (316) or Hastelloy Pump and Fittings.
• H. T. Lucite, Stainless (316), Rubberlined, Haveg, or Sethrin* Resin Filter Assemblies.
• Cotton, Dynel, Orlon, Nylon, Spun Glass, Porous Stone, or Porous Carbon Filter Tubes.
Distributors in Principal Cities
Write for Literature
Sethco MFG. CO.
70-72 Willoughby St., Brooklyn 1, N. Y.

Promat Kicker

The Promat Kicker, designed to superimpose a.c. over d.c. in electroplating, is manufactured in two general types; one with a voltage range for still tanks, semi or full automatic, and one with a voltage range for barrel plating. The a.c. voltage range for still tank, semi or full automatic is 1.6, 2.0, 2.4, 2.8 corresponding with d. c. operating voltages of 4.0, 5.0, 6.0 and 7.0.

The a.c. voltage range for barrel operation is 4.0, 4.4, 4.8, 5.2 corresponding with d.c. operating voltages of 10, 11, 12, 13.

The kickers are connected in series in one leg of the plating line, usually the anode leg. The cabinet can be placed at any convenient location between the power source and the plating tank. The anode bus bar is connected from the power source to the kicker input terminal and from the output terminal to the plating tank. The power line, either 220 or 440 volt, 60 cycle, single phase is connected to the kicker transformer primary at the junction box on the rear of the cabinet. Taps are provided for voltage adjustment. A fused switch, of the proper capacity for the unit, should be provided.

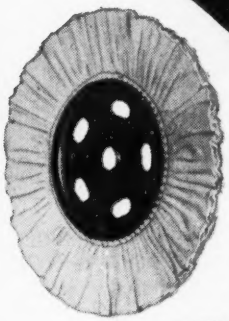
According to the manufacturer, Promat Div., Poor & Co., 851 S. Market St., Waukegan, Ill., one advantage in using a Kicker is that it is possible to apply higher current densities, since anode polarization and burning at the cathode are prevented.

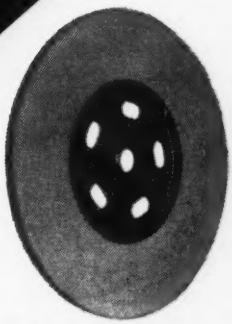
For further data circle No. 15 on Reader Service Card inside back cover.

FORMAX

the Perfect Combination

FROM START TO FINISH





ZIPPO CLOTH BUFFS

These famous long-wearing buffs run cool under all buffing conditions. High count bias-cut cloth is assembled on ventilated steel centers. Each section is perfectly balanced and faced—requires no raking.

BUFFING COMPOUNDS

Formax produces a complete line of buffing compounds in bar, tube and liquid form.

Our extensive manufacturing, laboratory and testing facilities are at your disposal.

ZIPPO SISAL BUFFS

You have a pleasant surprise coming if you haven't tried the new Zippo bias-type sisal buff. It was specifically developed for steel buffing—to blend polishing grit lines—to cut down stainless steel—and bring up a bright lustre.

Other Formax products include the well-known C-20 Flexible Contact Wheels and F-26 Abrasive Belt Grease Stick.

Descriptive Catalogs Sent on Request

FORMAX MFG. CORP.

DETROIT 7, MICHIGAN

"THE FOUR McALEERS"

Alkaline Deruster

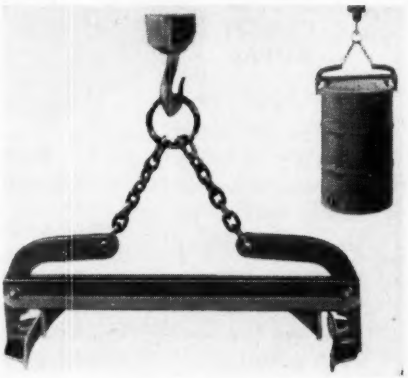
Oakite Products, Inc., manufacturer of specialized cleaning and allied materials has announced the development of "Oakite Rustripper," designed for alkaline derusting of precision parts where dimensional change and acid embrittlement must be avoided. In addition to removing rust and heat scale from ferrous metals, this material has also proved effective in certain cases for descaling heat-treated titanium in aircraft plants.

Oakite Rustripper, the manufacturer states, is a heavy duty, off-white powder that may be used in hot or cold solutions. It may also be used with direct current to remove deep-pitted rust, or reverse current to remove heat scale. Among the advantages claimed for this material are: (1) it will not attack sound metal; (2) it will not cause hydrogen embrittlement; (3) it does not require special equipment, such as stainless steel tanks; (4) it assures safety of regular equipment; (5) it creates no troublesome fumes; (6) it may be disposed of in the same manner as any highly alkaline solution; (7) it strips certain types of paint at the same time as it removes rust; and (8) it protects against rerusting.

Further information on this new alkaline descaler will be sent to readers writing on company letterhead to Oakite Products, Inc., 120 Rector St., New York 6, N. Y.

Vertical Drum Lifter

Manufacturer: Palmer - Shile Co., 12613 Mansfield, Detroit 27, Mich., designer and manufacturer of materials handling equipment.



Vertical Drum Lifter

This vertical drum lifter saves plant space, and was developed to handle open and closed drums. It has sure-hold safety barrel grip, is made of steel with heavily welded chain, and may be used on either high or low ceilings.

For further data circle No. 16 on Reader Service Card inside back cover.

IS
YOUR
PROBLEM
BURNSIHING?
HOLLAND SUGGESTS:
Motor Driven Tilting Tumbling Barrels for cleaning, polishing, grinding, deburring, sanding, burnishing and various other applications.
WRITE for New Holland Equipment Catalog
J. HOLLAND & SONS, INC.
276 SOUTH NINTH STREET • BROOKLYN 11 N Y

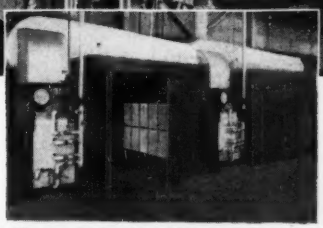
...another Controlled Baking and Drying Problem solved by

YOUNG & BERTKE

FOR

Formica®

ENAMELS • RESINS



Material is saturated with resin and then fed through this large oven and dried at a controlled speed and resin content.

Young & Bertke Industrial Ovens are used extensively in the manufacture of "FORMICA"® — a quality finish with beauty and endurance. There is much more to "FORMICA" than appears on the surface.

If you contemplate a new Oven or Complete Ultra-Modern FINISHING SYSTEM, Young & Bertke is better equipped, better engineered and better qualified to determine your equipment needs. 45 years of experience in Engineering, Design, Fabrication and Installation of large and small ovens for Industrial and Laboratory use.

Write for Brochure.

Sheets are placed in this oven and redried before being pressed.

Temperature controls the Manufacture of "Formica"®

LACQUERS • PAINTS & VARNISHES

The YOUNG & BERTKE Co.

OVENS • SPRAY BOOTHS • DUST AND FUME CONTROL

2291 BUCK ST. CINCINNATI 14, OHIO

Protective Tape

A paper-backed protective tape that is resistant to outdoor exposure for protecting smooth surfaces during storage and fabrication has been announced by Minnesota Mining and Manufacturing Co., St. Paul, Minn.

Tradenamed "Scotch" brand protective tape No. 344, the new black paper tape is believed to be the first tape of its kind to be entirely resistant to outdoor weathering for periods up to six months in duration.

The tape—designed to protect polished and finished surfaces against scratches and die marks during and after fabrication, shipment and storage—features a film-like adhesive that sticks immediately upon contact to such materials as stainless steel, aluminum (not anodized), glass, plated metals, polystryene, and polyester.

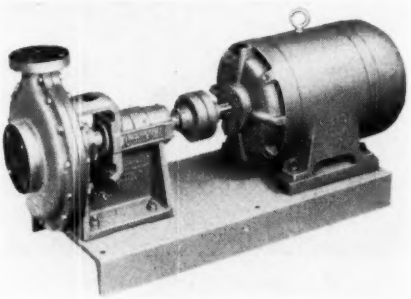
Although the tape's black paper backing resists abrasion, occasional fractures in the backing do not harm the rubbery adhesive which stretches to continue protecting the covered surface during storage and fabrication.

For further data circle No. 17 on Reader Service Card inside back cover.

Application of Protective Tape No. 344 to a polished metal sheet

Vulcanized Rubber Lined Centrifugal Pump

Industrial Filter & Pump Manufacturing Company, 5904 Ogden Ave., Chicago 50, Illinois, has announced an improved line of vulcanized rubber lined centrifugal pumps. These pumps are designed for severe, continuous service in handling corrosive and non-corrosive liquids in refineries, chemical processing and food plants, and metal finishing departments.



Vulcanized Rubber Lined Centrifugal Pump

Lined with soft rubber for abrasive slurries or hard rubber as specified, balanced rotating assembly mounted in ball bearings, corrosion-proof stuffing box to permit external liquid seal if required, easily removable packing gland nut and ample space for repacking stuffing box, simple adjustment of impeller clearance are some of the construction features.

The pumps are available in a range of sizes with capacities up to 240 gpm., operating heads of 240 feet and

¾ to 15 h.p. They are furnished either with or without base, motor, and coupling. Literature available.

For further data circle No. 18 on Reader Service Card inside back cover.

Stripper for Epoxy Type Enamels

Enthone, Inc., Dept. PF, 442 Elm Street, New Haven, Conn., has announced the development of Enthone Stripper S-18 to remove Epoxy type enamels and most other enamels. Operated at room temperature the stripper loosens the enamel by a wrinkling action; then the stripper and loosened enamel are removed from the work by means of a water rinse. A water seal used on Stripper S-18 reduces evaporating losses. Non-flammable, it is mild in odor and pleasant to use.

For further data circle No. 19 on Reader Service Card inside back cover.

Spray Booth Coating

Successful development of a white-pigmented vinyl coating for paint spray booths has been announced by W. F. Newbery, director of sales for the Detrex Corporation of Detroit.

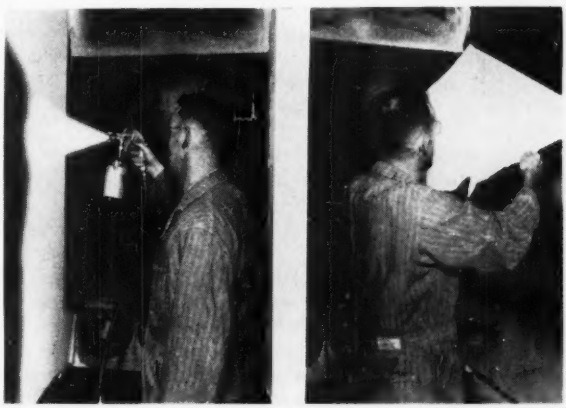
Called "White Vincote," the material is sprayed on wall surfaces of spray booths. Drying almost at once to a tough, white film, it permits paint, lacquer and enamel overspray to be peeled off quickly and easily, the manufacturer states.

White Vincote, when dry, is a poor base for combustion, it is stated. Its color permits high light reflectivity which cannot help but assist the operator to obtain a better finish on the product. Simplicity of applying and removing White Vincote reduces booth maintenance to minor operation, it is claimed.

White Vincote is to be used "as is" without further thinning. Increased tensile strength has been incorporated into the new product. There are also no ingredients in White Vincote that will induce "blushing" or "dusting." The color density is an easy guide to the operator in applying the correct thickness to wall surfaces.

Depending upon the thickness desired, one gallon of White Vincote will cover between 250 and 400 square feet of surface, according to L. C. Camel, sales manager for The Detrex Chemical Processing Division.

For further data circle No. 20 on Reader Service Card inside back cover.



The simplicity of the application and removal of White Vincote, vinyl protective covering for wall surfaces of paint spray booths, is shown in these two photos. Easily sprayed on, at left, White Vincote is just as easily peeled off and, along with it, all accumulated paint overspray.

Practical Applications of modern products

How Norris Ordnance Puts Protective Coatings on Steel Cartridge Cases

This plant developed zinc plated steel cartridges for the U. S. Navy. Here's a description of the plating process and the plating installation.

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UNTIL 1942, virtually all large caliber cartridge cases were made of brass, a material which possesses many properties that make it a logical choice for such a product: drawability, good cold worked strength, flexibility and corrosion resistance.

At the outbreak of World War II, it became apparent that the needs of our National Defense effort might outstrip our supplies of copper and zinc. A program was adopted to eliminate the use of these materials wherever possible. The use of steel to replace brass in the manufacture of artillery cartridge cases was proposed.

In 1942, several manufacturing concerns were given contracts for the development of steel cartridge cases. Among these was the Norris-Stamping & Manufacturing Company of Los Angeles (now the Norris-Thermador Corporation, operator of the Riverbank Ordnance Plant).

Steel as a substitute for brass in the production of cartridge cases had a high tensile modulus of elasticity which produced a low recovery or springback. This characteristic made steel cases prone to stick in the gun chamber after firing. Steel also had a marked notch sensitivity, which often caused rupture during firing, and poor resistance to corrosion.

Faced with these material limitations, a comprehensive development program was undertaken by Norris and the Army Ordnance Corps to solve the attendant problems. The success of this program is evident from the fact that during World War II, Norris manufactured millions of large caliber steel cartridge cases for both the Army and the Navy, and that the manufacturing techniques developed have served as the standard for the bulk of the industry.

The substitution of steel for brass in the manufacture of large caliber cartridge cases made it necessary to develop a corrosion-resistant coating to protect the steel base material. Phenolic varnish and zinc plate are the two coatings now in general use. Cases manufactured for the Army are usually protected with phenolic varnish, whereas, those produced for the Navy are zinc plated.

Coating Requirements

Specification O. S. 1394, "Specifica-

tions for the Corrosion Resistance Requirements of Steel Cartridge Cases," published by the U. S. Naval Gun Factory, states:

1. No process shall be approved by the Bureau of Ordnance which involves a coating which will react with or in any way affect the propellant or any other ammunition component with which it may be in contact in service.

2. No process shall be approved which requires an application of material greater than 0.0005 or less than 0.0002 inch.

3. All cartridge cases shall withstand a 20 per cent salt spray at room temperature for 120 hours without exhibiting rust from the base metal, and shall not show any accumulation of corrosion products (from the decomposition of the coating itself) sufficient to prevent their gaging. The coatings used shall withstand the corrosion ordinarily produced by contact of dissimilar metals at the mouth and primer chamber. The coating shall also prevent any formation of rust when the cases are scratched through to the steel.

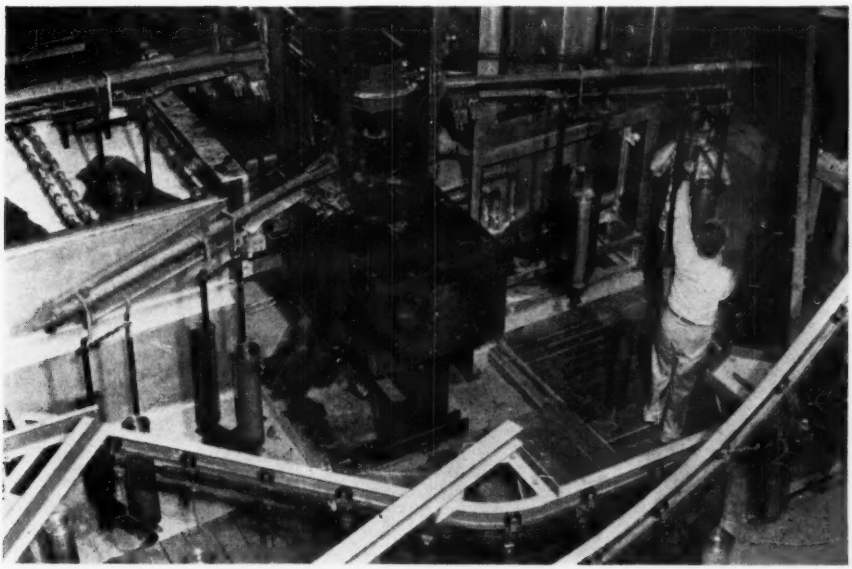

Fig. 1—Loading and unloading station of Hanson-Van Winkle-Munning automatic plating machine.

FIGURE 2. LAYOUT OF HANSON-VAN WINKLE-MUNNING AUTOMATIC PLATING MACHINE

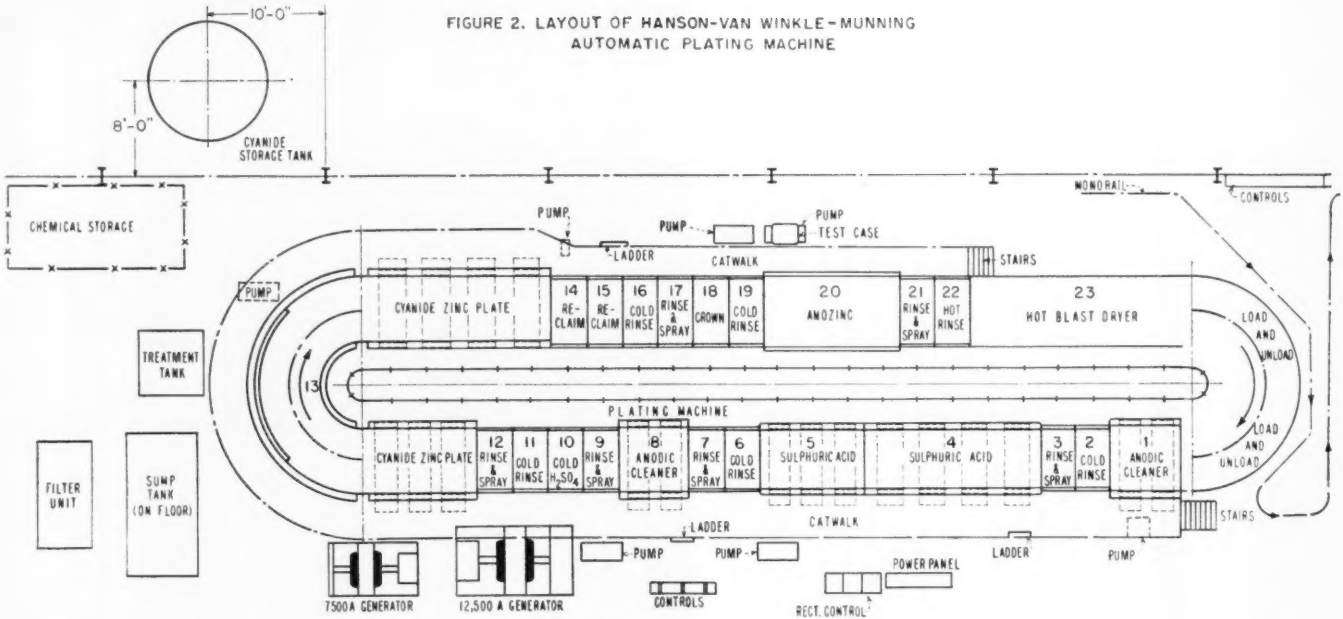

Fig. 2—Plating installation layout. Note how various processing equipment is located around the central conveyor structure.

4. All coatings shall withstand deformation without any loss of adherence, flaking, or peeling.

5. All coatings shall be free from uncoated areas, scratches, abrasions, checking or peeling.

Zinc Plating Process

The process in use at the Riverbank Ordnance Plant consists of three basic functions: (1) preparation of the work surfaces for zinc plating, (2) application of the zinc plate by electrodeposition in an alkaline cyanide plating bath, and (3) application of a zinc chromate conversion film to the surface of the zinc plate by electrolytic action. Cartridge cases are plated in an automatic plating machine (Fig. 1) designed and built by Hanson-Van Winkle-Munning Co., Matawan, N. J.

Figure 2 illustrates the manner in which the various processing operations are located around the central conveyor structure. These operations are detailed below.

1. Cathodic Electrocleaner — to remove grease, oil and other soil to promote uniform acid pickling in a subsequent operation. A solution of 8 oz./gal. of a proprietary alkaline cleaner compound operated at a temperature of 140 deg. F. is employed. Current density, 30 amp./sq. ft.; work cathodic.

2 and 3. Overflow Fresh Water Rinses. Fresh water is continuously pumped into each rinse tank during the rinsing operation to reduce contamination with rinsed off chemicals to a minimum. In the second rinse, top sprays are used for additional rinsing.

4. Mouth Pickle. The mouths of the cartridge cases are coated with a heavy film of iron oxide as a result of a previous processing operation. This oxide is removed by a 10 per cent sulfuric acid operated at a temperature of 150 deg. F. A pickling inhibitor is added as required to prevent excessive acid attack upon the steel.

5. Overall Pickle — to remove acid-soluble soil and superficial oxides from the surfaces of the work. A 10 per cent

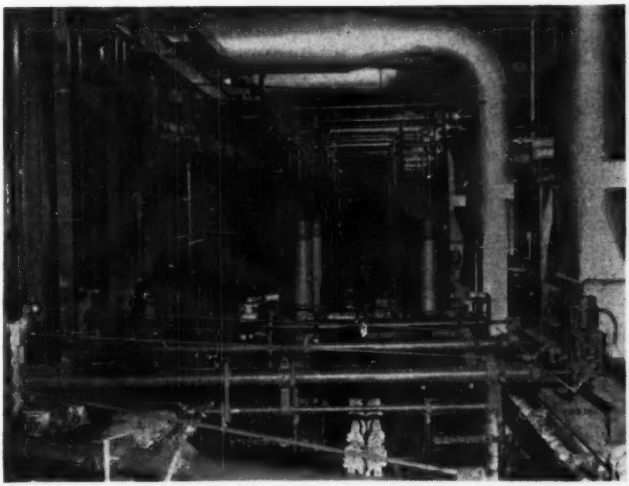

Fig. 3 — Transfer cycle of automatic plating machine. Conveyor arms in foreground are in lowered position supporting workholders and cases in the plating solution. Conveyor arms in the background are in the raised position transporting parts from one operation to the next.

solution of sulfuric acid at 150 deg. F. is employed. To prevent excessive acid attack upon the bright machined surfaces of the case, a wetting agent as well as an inhibitor is used.

6 and 7. Overflow Fresh Water Rinses.

8. Anodic Electrocleaner. The purpose of the second electrolytic cleaning operation is to remove pickling smut, any acid insoluble soil which remains after pickling and iron salts which may be present on the work surfaces. The solution employed consists of 12 oz./gal. of the same proprietary alkaline cleaner used in (1) at a temperature of 140 deg. F. The work in this operation, however, is anodic to prevent the electrodeposition of any metallic impurities present in the solution.

9. Overflow Fresh Water Rinse. Top sprays are utilized to provide thorough rinsing action.

10. Acid Rinse. A 10 per cent solution of sulfuric acid to which no inhibitor is added, operated at room temperature. The purpose of the acid rinse is to remove any oxide films caused by the action of the electrocleaner.

11 and 12. Overflow Fresh Water Rinses.

13. Zinc Plating. Close control must be exercised over current density of the internal and external circuits, composition of the plating solution, temperature of the plating solution, and maintenance of the workholders.

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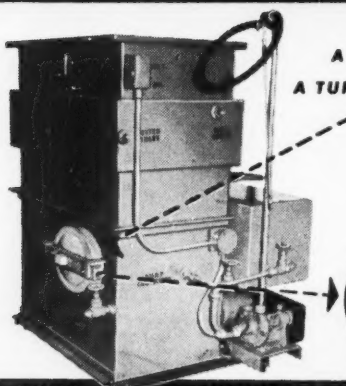

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ed daily for determination of plating thickness to insure that the product is meeting the plating requirement for thickness as specified in O. S. 1394. The optimum thickness of plate is 0.0003 to 0.0004 inch, obtainable with a current density of 35.0—37.5 a.s.f.

The alkaline cyanide plating bath consists essentially of sodium hydroxide, sodium cyanide and dissolved zinc. These constituents are held at the following nominal concentrations:

NaOH	15 oz./gal.
NaCN	15 oz./gal.
Zn	5.5 oz./gal.
NaCN/Zn ratio	2.75

Although the large volume of the plating bath (10,700 gallons) prevents rapid changes in the composition, a chemical analysis is performed during each eight hours of operation. Daily "standard" additions of caustic, cyanide and zinc anodes make up for depletion of solution from dragout and from electrodeposition of zinc.

Contamination of the plating bath occurs in the form of carbonates and "heavy metal" impurities. Carbonates build up slowly and are removed at infrequent intervals by the addition of hydrated lime. The carbonates are reduced by the formation of insoluble calcium carbonate which is precipitated, washed to recover soluble cyanide, and dumped.

Heavy metal impurities consist of lead or cadmium, small amounts of which can seriously affect the appearance and corrosion resistance of the zinc plate. Small additions of polysulfide are made regularly to precipitate such contaminants as metal sulfides which are subsequently filtered out of the solution.

Nominal operating temperature of the zinc plating solution is 90 deg. F., which is maintained through the use of automatic steam regulators in the steam line to the heating coils in the plating tank.

Misalignment of the workholders, worn or improperly adjusted electrical contacts (which also support the cases) or corroded conveyor arms or workholder hangers, resulting in poor electrical contact between the arms and workholders, are the most common sources of improperly plated cases. Preventive maintenance in the form of periodic inspection and repair as required is the most satisfactory control over such difficulties.

14. Plating Solution Reclaim. Dragout of the zinc plating solution on the work and workholders is substantial. A tank is provided into which the ex-

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cess dragout is permitted to drop. When sufficient solution has accumulated it is pumped back into the zinc plating tank.

15. Reclaim Rinse. The reclaim rinse consists of a water rinse which removes most of the zinc plating solution remaining on the work and workholders. The contaminated rinse water is pumped into the plating tank at the end of each shift's operation.

16 and 17. Overflow Fresh Water Rinse. Both tanks are equipped with top sprays to provide maximum rinsing action.

18. Chromate Dip. This automatic plating machine is designed so that a rinse chromate conversion film can be applied to the zinc plated surface either by an acidified dip (Cronak) or by electrolytic action (Anozinc). As presently operated, the Anozinc process is employed, and the Cronak operation is by-passed.

19. Overflow Fresh Water Rinse.

20. Anozinc. This process utilizes proprietary chemicals supplied by United Chromium, Inc. pH of the solution is 5.5 - 6.0. The Anozinc film is formed by electrolytic action with the work anodic.

The thickness of the film is directly proportional to the time and current density. Since the dwell cycle of the machine is determined by considerations other than application of the Anozinc, the time factor is constant, and film thickness is proportional to current density.

Current density is 10-15 amp./sq. ft. Appearance and adherence, as well as thickness of the Anozinc, are functions of the current density. Low density will produce very pale irridescent films;

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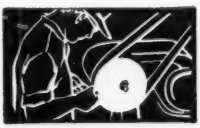

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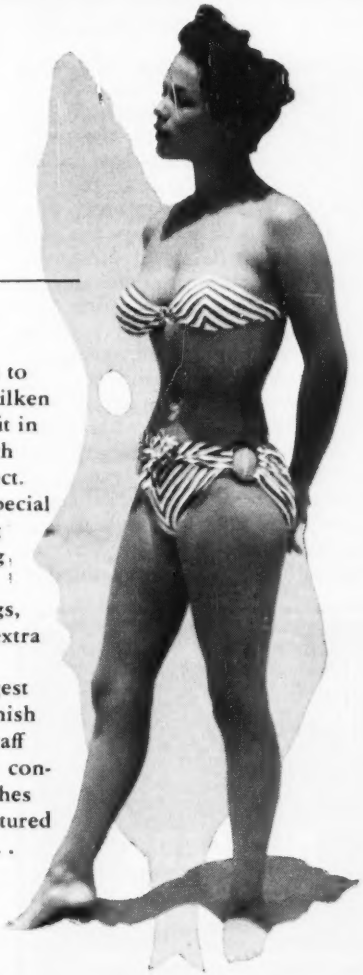

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whereas, high density will yield deep yellow, non-adherent coatings.

21 and 22. Overflow Fresh Water Rinses. Top sprays to provide maximum rinse action are employed in the first of these rinses (21), and the second rinse tank (22) is equipped with air blow-off jets which remove the pool of water from the flat head surface of the work. Such action promotes drying of the cases in the next operation.

23. Dry. In the hot air dryer, air is recirculated over finned heat exchangers, through ducts and manifolds, and is discharged through numerous 3/8-inch diameter jets which direct the blast of warm air against the external surfaces of the cartridge case and through the workholder inert anode to the inside of the cartridge case. Recirculation of the air is obtained by means of a duct with intake ports, mounted at the top of the dryer section, which carries the air to the suction side of the recirculating fan. Air temperature is approximately 150 deg. F.

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Key Pieces of Equipment

The heart of the H-VW-M plating machine is a fully automatic elevator or "jack rabbit" type conveyor. This conveyor has a vertical lift of 54 inches, and a forward transfer of 36 inches during each cycle. Two separate drive systems are provided, one for operation of the elevator lifting mechanism, and the other for the forward transfer.

Transfer time, including lift, forward transfer, and drop of the conveyor is 34 seconds. Dwell at the end of each transfer (with conveyor in lowered position) is adjustable between 0 and 120 seconds by means of an electric program timer. Dwell for plating of the 5"/38 caliber steel cartridge case is eleven seconds. Unit cycle time is equal to dwell time plus transfer time, in this instance 45 seconds, and is the controlling factor in the production rate.

In Fig. 3 conveyor arms in the foreground are in the lowered position supporting cases in the plating solution. In the background, conveyor arms in the raised position are transferring cases from one operation to the next.

The conveyor is equipped with 50 copper carrier arms extending outward from the central structure which supports the conveyor and the mechanism for the conveyor drive. The purpose of the carrier arm is to support workholders carrying the work and to conduct the electric current from bus bars to the workholders. Each arm is of bipolar construction consisting of a large weight-carrying member to which a smaller member is attached by means of insulated couplings.

Each member of the conveyor arm is equipped with sliding shoe electrical contacts which make up the electrical

circuit with bus bars mounted on the central structure.

Current to the bus bars is supplied by H-VW-M motor generator sets for the zinc plating operation, and by individual rectifier units for each of the electrolytic cleaning operations and for application of the Anozinc.

Two bipolar workholders (Fig. 4) are suspended from each conveyor arm. The workholder is constructed of two "J"-shaped copper bars (the ends of which form hangers) joined together, using a Teflon insulating gasket, to form a "U"-shaped framework. Two copper bars are brazed crosswise to the framework, one to each side of the insulated connection.

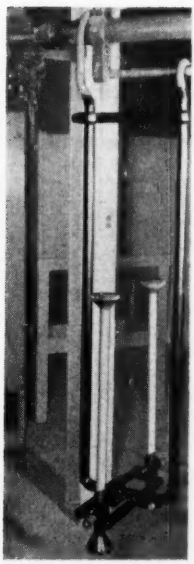


Fig. 4—Note manner in which the workholder is suspended from the conveyor arm. Also note the two inert anodes.

A nickel yoke is attached to both ends of one of these crosspieces. Two bronze electrical contacts (which also support the cartridge case) are threaded into the nickel yoke. An Inconel tube which serves as an internal inert electrode during zinc plating, is attached to each end of the second crosspiece and extends through the yoke and upward inside the steel cartridge case.

A Teflon insulator and the rack coating material prevent short circuiting between the yoke and the electrode. With the exception of the electrical contacts and the internal electrode, the workholder is completely coated with approximately ¼ inch vinyl resin protective coating material.

Fig. 5 — Double cone construction at the top of the inert anode on the workholder.

Each workholder holds two steel cartridge cases which are placed vertically, mouth down, over the internal electrode. In this position, an air bubble is trapped inside the head of the case between the primer boss and the sidewall. This air bubble would prevent processing that portion of the case. The inside inert electrode, however, is designed to correct this difficulty. A funnel at the bottom of the electrode collects processing solution from vertical jets suitably located in horizontal manifolds in the bottom of the tanks.

The collected processing solution is forced through the hollow electrode and out the top. A double cone head (with spiral shaped vanes between the cones) at the top of the electrode (Fig. 5) directs this solution into the air pocket inside the cartridge case head and imparts a swirling action which displaces the air bubble so that all surfaces are subjected to the solutions.

Various types of contact points which support the case and make electrical contact with the case through the workholder have been used. The better ones provide tapered surfaces.

The contacts are positioned so that

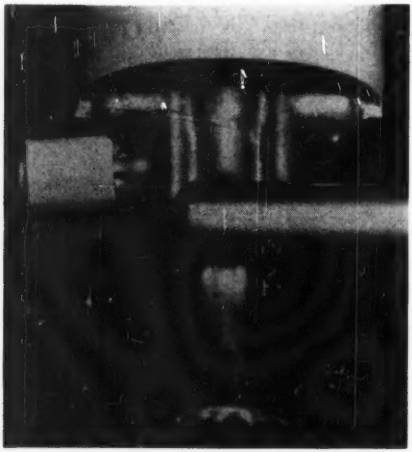


Fig. 6 — Workholder electrical contacts showing the method in which a cartridge case is supported by these contacts. The cone at the base of the workholder collects processing solution from manifolds in the bottom of the processing tank.

the mouth of the case rests upon the tapered surface but will not slip down over the lower edge of the contact points. Figure 6 illustrates the manner in which a case is supported.

An insulated locating pin projects from the top of the internal electrode and extends through the primer hole of the cartridge case to centralize the case with respect to the electrode thereby promoting even current density to obtain uniform thickness of the zinc plate in the internal surfaces of the case.

As previously mentioned, air and gases trapped inside the head of the cartridge case are removed by the action of the processing solution being forced through the inside electrode. Each section of the machine, where this action is required, is equipped with carrier-arm centering devices which locate the arm so that the collection cone, at the bottom of the inside electrode, is in alignment with the manifold jets in the bottom of the processing tank which distribute the processing solution (see Fig. 7).

That portion of the processing solution used to displace the air bubble in

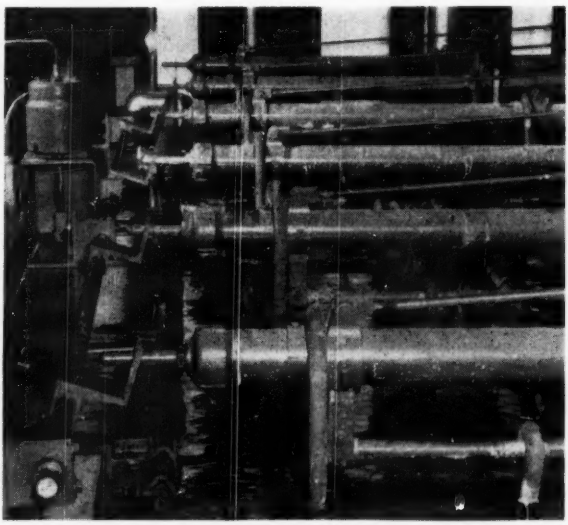


Fig. 7—Centering devices (left) provide positive alignment of the conveyor arms during the dwell cycle so that the workholders will be in alignment with the manifolds in the processing tank.

the head of the case is obtained by means of a circulating pump which draws solution from the processing tank and discharges the solution through the distribution manifold.

Overflow water rinsing operations utilize fresh water under high pressure. To prevent excess water consumption, the flow is regulated for timed intervals by means of an electrically operated Hydramotor valve.

Hanson-Van Winkle-Munning selenium rectifiers, with maximum output of 15 volts, 4000 amperes, are used to supply current for the electrolytic cleaning operations and for application of the Anozinc.

Current for the zinc plating operation is supplied by two H-VW-M 10 volt motor generator sets; one with an output of 12,500 amperes, attached to the external plating circuit, and the second with a capacity of 7500 amperes for the internal circuit.

An 800 gallon cyanide solution make-up tank with a motor-driven agitator is employed for preparing chemical additions to the zinc plating solution. Solution from the zinc plating tank continuously overflows a weir into a 1200 gallon sump tank from which the solution is pumped through a leaf-type, diatomaceous earth filter unit.

The filtered solution is then pumped back to the plating tank. A 12,000 gallon storage tank is provided so that the zinc plating system can be completely drained during periods when it becomes necessary to perform maintenance or repairs on the equipment. The plating tank and the auxiliary plating solution treatment equipment are shown in Figure 8.

For the thorough rinsing required, a system of top water sprays play upon the external surfaces of the work as it is removed from the rinse tank (Fig. 9). To promote drying of the cartridge

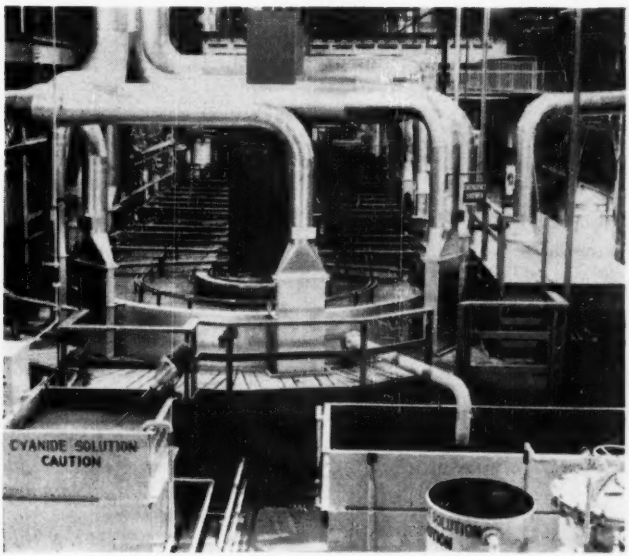


Fig. 8 — Hanson-Van Winkle-Munning automatic plating machine as seen from the plating tank end. The "J" - shaped zinc plating tank is at the center of the illustration and the various plating solution processing equipment is in the foreground. Note the extensive ventilating duct system employed for disposing of noxious fumes.

cases, the last rinsing operation is equipped with air blow-off jets mounted on the side of the tank so that the air jets will impinge on the heads of the cases as they are withdrawn from the rinse tank. The purpose of these air jets is to remove the pool of water which collects on the case heads.

Heat for the recirculated hot air dryer is supplied by fin and tube type heat exchangers. The hot air is forced through a system of ducts and manifolds and discharged through numerous 3/8 inch diameter jets that direct the air against all surfaces of the case. Recirculation is obtained by means of a duct with intake ports at the top of the dryer section which discharges to the suction side of the fan.

Process Effluent Collection and Disposal Systems

Considerable quantities of solutions containing acid, caustic, chromates and cyanides must be discharged and means provided for their disposal. Experience has shown that all solutions, other than those containing cyanides, can be collected and treated together.

Each processing tank is equipped with overflow weirs which maintain the maximum solution level in the tank approximately 3 inches below the top of the tank. Solution which flows over the weir is collected in a discharge line that empties directly into an acid brick-lined gutter. Floors adjacent to the processing area are sloped toward the gutters so that spillage of processing solutions may be flushed into gutters.

The gutters discharge into 36 by 36 inch sand traps with Duriron sewer pipe outlets which feed into a plant-wide acid effluent collection system. This in turn discharges into a collection well where the solution is processed automatically to neutralize any acid or alkali.

The neutralized effluent is then pumped to large settling beds where dry precipitated solids are removed and the clear effluent is discharged into an adjacent river.

In the zinc plating section and adjacent cyanide solution filtering and draining areas, the floors are sloped to drain into a separate system of gutters and sumps. The cyanide bearing solutions are discharged into a special sewer system to a cyanide destruction plant.

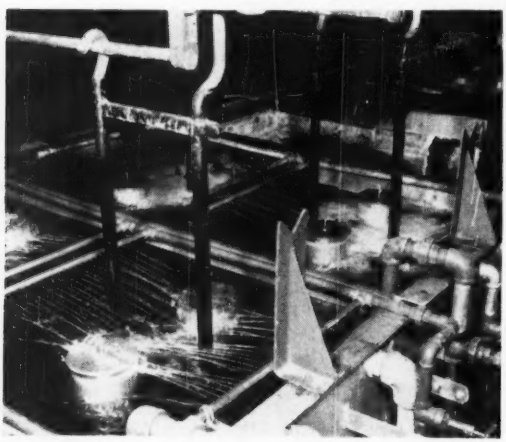


Fig. 9—Top spray used to provide additional rinsing action as cases are withdrawn from rinse tanks.

(Illustrations courtesy Norris-Thermador Corp., Los Angeles, Calif., and Hanson-Van Winkle-Munning Co., Matawan, N. J.)

Here the cyanide bearing solutions are continuously and automatically treated with chlorine, using Wallace & Tiernan equipment to completely destroy all cyanides. The treated effluent, now free of cyanide, is discharged into sumps together with the neutralized acid effluent.

The principal use of a new material, 4-79Ni Steel, developed by Armco Steel Corporation, is for small memory cores in high speed electronic computers. The steel is one-eighth of a thousandth thick. Sixteen such sheets pressed together would approximate the thickness of a human hair.

The name indicates that the steel contains 4 per cent molybdenum and 79 per cent nickel.

Since the beginning of the development of atomic energy, the element nickel has played an important part, particularly in the concentration and processing of atomic fuels. A large amount of nickel is used in a variety of forms, including nickel-plated coatings, high nickel alloys such as Monel and Inconel, and nickel-containing stainless steels.

KILN TYPE OVEN. A 4-page folder on a versatile line of Standard Kiln Type Ovens for baking, heating, drying, and curing is being distributed by the **Michigan Oven Company,** 415 Brainard, Detroit, Mich. It provides complete information on special features, performance and available sizes. The folder explains how this Standard Oven has been specially engineered to include "custom" features. The folder may be obtained by writing on your company letterhead to the above address.

For Dust Free Finishes!

BOND TACK CLOTH

IN ROLLS
Cut off any size piece to use as needed.

IN BULK
Cut and folded. Ready to use.

STAYS SOFT AND TACKY — A SPECK-FREE FINISH EVERY TIME

Now Available in Rolls or Cut Bulk—White or Gold In Three Different Types of Cloth

Get your Tack Cloth packed just the way it's easiest for you to use . . . either in 150 yard rolls of 36" wide cloth or in handy cartons . . . 100 or more Tack Cloths to the carton.

No matter which way you buy it, you can be sure that every square inch will stay SOFT and TACKY until the very last bit is used up!

The Cut Bulk size is 18" x 36" . . . folded to 4½" x 18" for ease of handling. ALL BOND TACK CLOTH is *Spontaneous Combustion Proof, Lint-Free* and *Wax-Free*. Gives a sparkling speck-free Finish *every time*. Clean and sanitary. No waste.

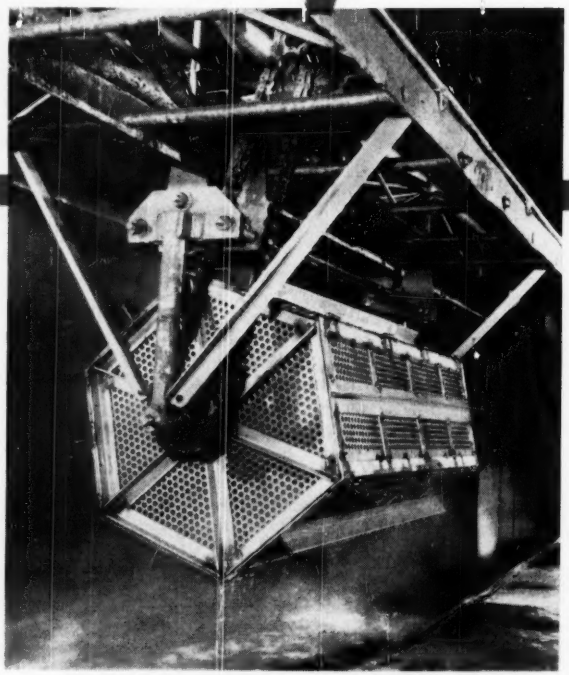
TRY THEM and COMPARE RESULTS. Samples Gladly Sent Upon Request.

BOND CHEMICAL PRODUCTS CO.
"The Tacky Wiper Specialists"
2639 N. CLYBOURN AVE. CHICAGO 14, ILLINOIS

ALSO INDIVIDUALLY PACKED IN GLASSINE ENVELOPES —144 to the Carton

A WARRANTY OF SATISFACTION IN EVERY CARTON

SUGGESTION IMPROVES FINISHING PROCESS



Compartmentalized Tumbler

SMALL aluminum parts are treated with Alodine* in a portable, power-driven tumbler at TEMCO Aircraft Corporation, Dallas, Texas. This mechanization of a hand dipping process, devised by Paul W. Green, processing foreman, saved time, made this job easier, and made possible the processing of a variety of parts at one time.

The hexagonal tumbler, fabricated from 16 gauge stainless steel, is over 4 feet long, 2 feet wide, and is perforated with ½-inch holes in a staggered pattern. Inside the tumbler, three perforated partitions secured by stainless steel angles permit segregation of four different varieties of parts. The partitions can be removed to admit parts up to 4 feet long when such parts have to be treated. A stainless steel flange runs from end to end on each outside face of the hexagonal tumbler. These fins act as stiffeners and serve also to agitate the solution.

While the tumbler is in the Alodine* solution, it is rotated by a motor and chain drive. The motor mount is secured to the overhead crane rack, and the tumbler is suspended from the motor mount. Conventional crane control buttons are used to move the tumbler over and into the 40-foot Alodine* tank.

This suggestion was submitted for publication in PRODUCTS FINISHING by Sidney H. Carter, public relations coordinator, TEMCO Aircraft Corp.

*Registered Trade Name, The American Chemical Paint Co., Ambler, Pa.

Send employee suggestions which have resulted in improved finishing processes to PRODUCTS FINISHING, 431 Main Street, Cincinnati 2, Ohio.

NEW! Extra Tough and Flexible

SPEKALUMINITE®

No. 316

MORE THAN 300 HOURS SALT SPRAY RESISTANCE!

DECORATIVE Aluminum Coating

SPEKALUMINITE No. 316 is specially formulated to meet the most exacting specifications. In addition to greater beauty, it has the greatest resistance of ALL Aluminum Organic Finishes. One Coat Applied Directly on Cold Rolled Steel Gives More Than 300 HOURS Salt Spray Resistance. Brighter • Harder • Will Not Peal or Flake • Produces a Beautiful Cadmium-bright Finish • Self Priming • Adheres Perfectly to All Metals and Plastics.

- No Primer Required
- Air Dries Dust Free in 15 minutes
- Remains Flexible at a Temperature of 1000° F.
- Easy to Apply
- Dip or Spray and Bake
- Requires no Expensive Equipment

Write for FREE Sample and Bulletin PF-9.

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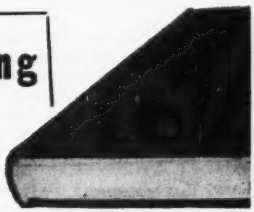
Bringing you Modern developments in plating processes and methods



HERE are the basic theories and principles of electroplating—the practical methods and processes that are of invaluable use to everyone concerned with electroplating and electrotyping. The most efficient methods of making electrodeposits on more than 40 different metals, alloys, and plastics are summarized completely in this thoroughly revised and enlarged book.

Principles of ELECTROPLATING & ELECTROFORMING

By William Blum, Chemist, U. S. Bureau of Standards and George B. Hogaboom, Consultant

Revised 3rd Edition
455 pages, 6 x 9
24 tables, illus.
$7.00.

Completely revised to make it a more practical working guide, this book summarizes and digests the best of modern practice in the field. It covers qualitative, quantitative analyses of solutions; pickling, dipping; electropolishing; electroforming, electrotyping; producing phonograph record matrices, and manufacturing tubes, etc. Metals are dealt with in the same order as in the periodic system of elements.

(*Please send check with order*)

PRODUCTS FINISHING, 431 Main Street, Cincinnati 2, Ohio

NEWS of the Industry

NEW PLANTS

Marking its fifth expansion in eight years, **BLUE M ELECTRIC COMPANY,** manufacturer of electric ovens, furnaces and related temperature control equipment for laboratories, pilot plants and production, is erecting a new 22,000 sq. ft., one story building on 2 acres in Blue Island, Illinois, a Chicago suburb. Occupancy will begin Sept. 15, 1954.

CRIPPEN & ERLICH LABORATORIES, INC., 1138 East North Avenue, Baltimore 2, Maryland, formerly The Raymond C. Crippen Research and Development Laboratories, has announced the incorporation of its laboratories and the expansion of its facilities by the completion of new testing, analysis, research, and development quarters for fuels, oils, lubricants, petroleum products, paints, and other products.

Bulletin No. 5 has just been published describing these services offered to manufacturers, distributors, and users of these products.

Acquisition of space which will double the facilities of the manufacturing, engineering, and executive departments of **CONFORMING MATRIX CORPORATION,** manufacturer of spray painting masks and automatic spray decorating machines, has been announced by H. E. MacArthur, president.

Included in the expansion program is a completely new machine manufacturing department. A large spray booth for the testing of machines under actual operating conditions has also been installed so that customers can see a practical demonstration of their equipment before shipment.

Concurrent with the announcement of plant expansion, Mr. MacArthur also issued a statement on the increase and realignment of the field sales force which will better enable the company to serve the needs of customers throughout America and Canada.

E. L. Faber, who for the past three years has been production superintendent and chief engineer, has enlarged the designing and engineering development department to meet the increasing need for high production spray decorating equipment.

COMPANIES

The **DETREX CORPORATION** of Detroit, manufacturer of chemicals and industrial metal cleaning equipment, has established a New England Regional Office at 35 Colony St., Meriden, Conn., W. F. Newbery, director of sales, has announced.

Headed by A. D. Chabot, New England Region manager, the new Detrex office will serve Vermont, Maine, New Hampshire, Massachusetts, Connecticut and Rhode Island.

A veteran of the metal cleaning field for 18 years, Mr. Chabot is a graduate of the University of Connecticut where he received his B.S. degree in mechanical engineering.

The sales-engineering firm of John T. Couchman Company, Indianapolis, is now **COUCHMAN-CONANT, INC.,** as Alan Conant joins the organization.

Both Mr. Couchman, in Indiana, and Mr. Conant, formerly on the West Coast, have been associated with Edwin L. Wiegand Company, manufacturer of Chromalox electric heating units, for more than 20 years.

Constantly growing demand for Chromalox equipment for industrial processes and domestic appliances has prompted this sales agency expansion. Additional field engineering personnel will be added in the near future, according to Mr. Couchman.

Albert H. Clem, president of the Chemical Specialties Division of the **PENNSYLVANIA SALT MANUFACTURING COMPANY**, has announced the establishment of **PENNSALT CHEMICALS OF CANADA.**

Under an agreement with Canadian Industries, Ltd., who for the past 15 years have handled Pennsalt metal cleaners sales in Canada, this new component of the 104-year old, multi-plant Philadelphia Company will serve its growing Canadian markets through new sales office and warehouse facilities in Hamilton, Ontario.

William B. Billingsley, formerly of CIL and well known in Canadian metal finishing circles for more than 20 years, has been named manager of the new division.

THE MONROE SANDER CORPORATION, Long Island City, N. Y., manufacturers of industrial finishes, held the annual sales meeting on June 14th at the Harmonie Club in New York City.

Discussions at this meeting were devoted to the development of new products and their application, treatment and uses in additional fields and a broader sales policy. The company has installed additional new and modern machinery to take care of production.

Demonstrations of what can be accomplished by precision barrel finishing will be a feature of an exhibit by the **LORD CHEMICAL CORP.** of York, Pa., at the first annual Pennsylvania Industrial and Construction Exposition to be held in Harrisburg, Pa., the week of Sept. 20.

Sponsored as a public service by the Keystone Building Contractors Association in cooperation with the Pennsylvania Department of Commerce, the mammoth showing of "Pennsylvania on Parade" will be staged Sept. 20-25 in Harrisburg's huge Farm Show Building.

The Lord Chemical Corp. will exhibit 20 pieces of tumbling compounds and samples of tumbled work in steel and steel alloys and copper and copper alloys. These will be shown before tumbling and after tumbling. In addition, the firm will show its small Lorco 100 Bench Tumbling Barrel. This piece also will be displayed with a transparent drum to allow visitors to see the action of the materials when the barrel is in motion.

WIRETEX MANUFACTURING CO., 40 Mason St., Fairfield, Conn., manufacturer of all kinds of wire mesh baskets, retorts, muffles, grids, screens, racks for quenching, carburizing, salt baths, dry heat applications, has appointed **TROUTMAN ASSOCIATES,** P. O. Box 613, Louisville, Ky., as sales representative to cover Indiana, Kentucky, Tennessee, Southwestern Ohio and certain counties in Illnois.

Also appointed is the **H. W. PARET CO.,** P. O. Box 16, Sewickley, Pa., for the territory of Western Pennsylvania and Eastern Ohio.

Front row (left to right): Elliott Wright, Phil Fredericks, Monroe Sander, Hal Tanney, Morris Dauber. Rear (left to right): George Black, Herb Kaye, Sam Dorfman, Leo Zimmermann, Pete Sullivan, Erwin J. Rotheim.

Howard B. Downs, vice president and general manager of **SOLVENTOL CHEMICAL PRODUCTS, INC.**, Detroit, has announced that the Electro Chemical Engineering Company, Ltd. Weybridge, Surrey, England, has been licensed to manufacture Solventol Di-Phase clearers and cleaning equipment under the Solventol patents. The company will have exclusive sales rights for Solventol cleaners and cleaning equipment in the British Empire and all Continental Europe outside the Iron Curtain.

James Eric Entwistle, of the English firm, has been in the United States for several months studying the Solventol operation. Mr. Entwistle, a chemical engineer, has been an executive of the Electro Chemical Engineering Company for several years.

FREDERIC B. STEVENS OF CANADA, LTD., has purchased the **ROTO-FINISH COMPANY OF CANADA, LTD.**, including manfacturing rights and complete inventory.

The Roto-Finish complete line of metal finishing tumbling equipment, processes and supplies will be stocked in the Stevens Toronto warehouse and the recently enlarged Windsor warehouse for rapid delivery to all parts of Canada.

NEW POSITIONS

Hanson - Van Winkle - Munning Company, Matawan, N. J., has announced the election of **J. C. MILLER** and **G. H. WALGREN** to its board of directors.

Mr. Miller, until his organization became a division of H-VW-M, was chairman of the board of the J. C. Miller Company, Grand Rapids, Mich., which he founded in 1920. Mr. Walgren, who has been with J. C. Miller for more than 18 years, was president of this company.

G. H. Walgren (left), J. C. Miller

Mr. Walgren has been appointed vice-president of H-VW-M and has been placed in charge of J. C. Miller Division. The facilities and policies which have accounted for the success of the J. C. Miller Company will be continued.

Other appointments to the management team of the Miller Division include **J. A. BADALUCCO** as assistant general manager; **F. W. MAY** as manager of sales; and **C. E. JACKSON** as purchasing agent. All of these men were with Miller in similar capacities for many years.

Apothecaries Hall Company has announced the promotion of **FREDERICK S. FOSTER** to the position of manager, Industrial Chemicals Department.

Mr. Foster is a graduate of DePauw University, Greencastle, Indiana, class of 1932, where he majored in chemistry. He received a B.A. degree and was elected to Phi Beta Kappa. He took post graduate work at Colgate University.

POCKET **HANDI-GAGE**

A MAGNETIC THICKNESS TESTER

for electrodeposited, hot-dipped and painted coatings on steel. No bigger than a fountain pen, but what a job it does! Tests plated, painted, enameled, or plastic laminated coatings in SECONDS—in the lab or on the production line. Accurate, quick and easy to use.

Platers Research CORPORATION

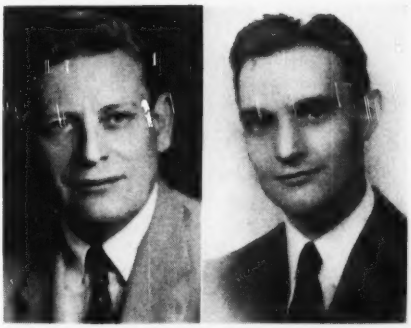
59 EAST 4TH STREET — NEW YORK 3, N. Y.

Mr. Foster has been associated with Apothecaries Hall Company since 1934. He worked in the company's analytical and research laboratory for seven years. He was in charge of allocations and priorities for three years. For seven years Mr. Foster was in the sales department, and from 1948 to 1951 served in the capacity of sales engineer. Since July 1951 Mr. Foster has been assistant to the vice-president.

In his new position he will be in charge of all phases of the company's operations involving industrial chemicals. He will report directly to the president.

THEODORE Z. VOYDA, chief chemist of Apothecaries Hall Company since 1946 has been named technical director, reporting to the president. Mr. Voyda is a University of Connecticut graduate where he received a B.S. Degree in 1939 and M.S. Degree in 1944.

Mr. Voyda has been engaged in metal finishing activities for the past fourteen years and was formerly supervisor of electro-chemical research and development at Pratt and Whitney Aircraft in East Hartford. He is a member of the American Electroplaters Society, the Electrochemical Society, the American Chemical Society and Sigma Xi, honorary scientific society.



Frederick S. Foster (left), Theodore Z. Voyda

In his new capacity, Mr. Voyda will be in charge of the product development and research groups, as well as the technical service section, relating to metal finishing and detergents.

Formation of a specialized resins sales group to expand both surface coating and

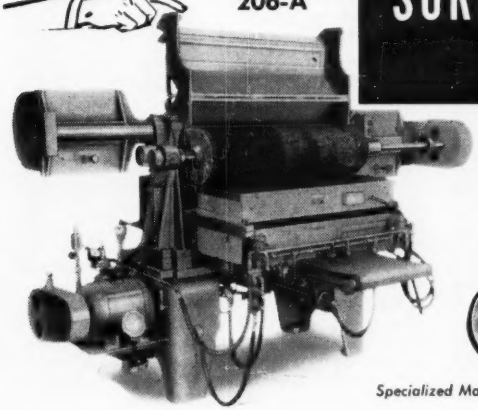
Here's the answer to your

SURFACE FINISHING PROBLEMS!

★ **FROM ROUGH GLAZE TO MIRROR FINISH**

CLAIR Model 206-A

SURFACE FINISHING MACHINE



Developed for surface finishing small hand tools, machine is equipped for mechanical holding or magnetic chuck, operated by an electro-hydraulic system. Spindle of single roll will accommodate buffs from 3" to 12" in dia. Work area with mechanical holding fixtures is 38" x 24"; with magnetic chuck, 38" x 14".

Write for Bulletin 206.

CLAIR

MANUFACTURING CO. INC.

Specialized Machine Equipment for Glazing and Polishing Operations

OLEAN, N. Y.

(Left to right) G. F. Metzinger, W. A. Hubbard, D. M. Neely, R. L. Hallam, F. C. Herot.

structural applications of Epon resins has been announced by Shell Chemical Corporation.

Five senior technical salesmen are the initial members of the new sales group. They recently completed an intensive six-week training program at the company's laboratory at Union, New Jersey.

Enlargement of the group is planned to coincide with further expansion of the market for Shell Chemical's Epon series of epoxy resins. These resins are an entirely new class of condensation polymer exhibiting an unusual combination of excellent adhesion, superior chemical resistance and outstanding flexibility.

The new sales group program puts into the field technical sales personnel who are up to date on the latest developments and applications of Epon resins, which have won wide industry acceptance in a short period.

The five senior salesmen forming the new group are: **R. L. HALLAM,** Detroit; **F. C. HEROT,** Cleveland; **W. A. HUBBARD,** Chicago; **G. F. METZINGER,** Newark, N. J.; and **D. M. NEELY,** N. Y.

Mr. Hallam, who received a B.S. in chemistry from the Detroit Institute of Technology, joined Shell Chemical in 1949 at Detroit as a technical salesman.

Mr. Herot received a B.S. degree in chemical engineering from the Case Institute of Technology, Cleveland. He joined Shell at Cleveland in 1949 as a technical salesman.

Mr. Hubbard received a B.S. degree in chemical engineering from the Missouri School of Mines and an M.A. degree in marketing from Harvard Business School. He joined Shell at Wood River, Illinois, in 1944 as a technical assistant and has most recently served in the Newark, N. J., marketing district.

Mr. Metzinger, who received a B.S. degree in chemistry from the University of Illinois, joined Shell in New York as a technical salesman in 1949.

Mr. Neely received a B.S. degree in chemical engineering from Fresno State College and Yale University. He joined Shell Chemical as a technologist and senior technical salesman.

BURTON G. ADAMS has been appointed sales representative in Southern California for the Chemical Specialties Division of the Pennsylvania Salt Manufacturing Company. Announcement of his appointment has been made by Joseph J. Duffy, Metal Processing Department manager.

Burton G. Adams

Mr. Adams will be responsible for the full line of Pennsalt cleaning and metal surface preparations, including the Foscoat and Fosbond processes, and will be available for service to metal finishing companies throughout the Southern California area. He will have his headquarters at 4820 Loma Vista Avenue, Los Angeles.

Mr. Adams will work under the supervision of Richard A. Snyder, a well-known figure to the California metal working industry. A native of California, Mr. Adams was recently graduated from the University of California.

RICHARD C. GOEBNER has joined the staff of the Pennsylvania Salt Manufacturing Company's Metal Processing Department as a sales trainee. He will replace **MAL PANCOAST**, who is transferring to field training.

Mr. Goebner, a veteran of two tours of duty with the Second Marine Division, received his secondary education at Dickinson College where he majored in chemistry and mathematics.

Three executive appointments in Pittsburgh Plate Glass Company's paint division have been announced by E. D. Peck, vice president in charge of the paint and brush division.

JOHN F. GREEN was named assistant general manager of the Ditzler Color Division in Detroit. **WALTER W. ETHIER, JR.**, succeeds Mr. Green as factory manager of the Atlanta Paint Division in East Point, Georgia. **CHARLES R. HOLMAN**, manager of the Selectron department at Springdale, Pa., replaces Mr. Ethier as assistant divisional manager of the Newark, N. J., paint division.

Mr. Green has headed the Atlanta paint division since it was placed in operation two years ago. He joined Pittsburgh Plate at the Oakland, California, unit of the Pacific Coast paint division in 1933. In 1940 he was assigned to the Milwaukee paint division as assistant supervisor of automotive sales. Prior to going to Atlanta, he was manager of trade.

Paul W. Moehle

PAUL W. MOEHLE has been appointed West Central Region manager for the Detrex Corporation of Detroit, producer of metal-cleaning machinery and chemicals, according to W. F. Newbery, director of sales.

A member of the Detrex organization for 16 years, Mr. Moehle began in the purchasing department, then became a field sales representative, and for the past three years served as national accounts manager.

He will continue to serve as national accounts manager in addition to his new duties as West Central Region manager.

A native of Washington, D. C., Mr. Moehle is a member of the Detroit Branch, American Electroplaters' Society.

G. W. Hofstetter

William N. Noble, vice president in charge of Porcelain Enamel Frit and Glaze Div., Ferro Corporation, Cleveland, Ohio, has announced the appointment of **G. W. HOFSTETTER** as manager of the Ferro Frit and Glaze Division. Mr. Hofstetter, well known in the ceramic industry field, takes over this post after ten years as manager of Ferro's Midwest Sales Division. He will make his headquarters in the home office of Ferro at Cleveland.

Prior to joining Ferro, Mr. Hofstetter was associated with the sales staff of Rohm & Haas Company, and before that was porcelain enameling superintendent for the Seeger Refrigerator Company, St. Paul, Minnesota.

He is a graduate in Ceramic Engineering from Ohio State University.

William J. Fabish

WILLIAM J. FABISH has been appointed Eastern representative for Hammond Machinery Builders, Inc., Kalamazoo, Michigan. Mr. Fabish has been serving the metal-working industry in the East for the past 12 years. He will be concerned with sales and service for Hammond's complete line of grinding, polishing, buffing, deburring machinery and Duskolectors.

I. WENDELL HAMM of Seaford, Delaware, has been appointed director of manufacturing for The Carborundum Company, according to an announcement by General Clinton F. Robinson, president of the company.

Mr. Hamm joined the DuPont Company in 1934 as an industrial engineer at the Rayon Division, Richmond, Virginia. Since then, he has been successively promoted, serving as a management engineer and trouble shooter for the company. His latest position was that of chief of industrial engineering for the Nylon Division in Seaford.

A native of Port Washington, New York, Mr. Hamm attended Bucknell University for one year, transferred to Cornell, and was graduated from that university in 1932 with a degree of Mechanical Engineer. In 1933 he received his Masters Degree in Mechanical Engineering from Cornell, and served as a student engineer and foreman at the Ritter Dental Company in Rochester for a brief interim before accepting his initial position with the DuPont Company.

Active in civic and community affairs throughout his career, the new director of manufacturing has served as chairman of numerous membership and fund raising campaigns, and has been active in the development of church, social, and educational groups.

SPEED UP YOUR PRODUCTION AND CUT YOUR COSTS . . . with the new

PLACO CENTRIFUGAL DRYER

Only $469.50

After 5 years of highly successful field testing, this skillfully designed dryer FOR PLATED, LACQUERED AND JAPANNED PRODUCTS is now ready for you!

These new features make it the *best dryer* you can buy!

FASTER DRYING—Sets a new speed record . . . 865 r.p.m.—more than 30% faster than standard units! Dries up to 50 lbs. in less than 3 minutes!
MORE EFFICIENT — Powerful centrifugal force holds parts immovable—assures a longer-lasting, highly-polished, completely dried surface. Built-in centering device for machined rods and rings supports mesh basket in perfect balance. Quick and effortless stoppage.
COMPACT AND RUGGED — Only 32½" high, occupies but 25" x 43" of floor space. Durable ½" steel plate construction; 3 phase, 220/440 volt 1 H.P. 60 cycle A.C. motor, reversing drum switch and 12"x12" steel mesh basket.
ECONOMICAL—Requires a minimum of maintenance. Replaces sawdust and compressed air drying of small pieces. Accessories also available.

METAL FINISHING MANUFACTURING CORP.
84 North 11th Street Brooklyn, New York

Robert A. Embree

ROBERT A. EMBREE has been appointed process and plant engineer of the Motor - generator Division of Chandeysson Electric Co., St. Louis. Mr. Embree graduated from Iowa State College as an electrical engineer. Thereafter, he specialized in methods and process engineering, as well as industrial management. During the past 16 years, he held several management positions with Laclede Christy, his most recent having been plant manager.

In his new capacity, Mr. Embree will have charge of manufacturing methods, processes, equipment and facilities.

1954 is the Golden Jubilee year of Chandeysson Electric Company, 4078 Bingham Ave., St. Louis, Mo.

CARL R. SARE, formerly vice president and a member of the board of directors, has been named president of the W. W. Sly Mfg. Co., succeeding Frank W. Klatt, who has retired. Prior to his present association, Mr. Sare served as assistant to the president of the Patterson Foundry and Machine Company of East Liverpool, Ohio, and as a production executive of the American Steel and Wire Division of the United States Steel Corporation. After receiving his degree at the University of Pittsburgh, he began his career as a sales engineer for the A. M. Byers Co. and later the Jones and Laughlin Steel Corporation.

The W. W. Sly Mfg. Co., founded in 1874, is today one of the nation's largest builders of industrial dust filters, tumbling mills and blast cleaning equipment. The company has recently organized a new division for the production of industrial ovens, and Mr. Sare estimates that this diversification together with industry's increasing awareness of dust problems will result in an increase in sales for this year over 1953.

L. Francis Case, president of the Central Paint & Varnish Works, Inc., 59 Prospect St., Brooklyn 1, N. Y., has announced the appointment of **A. JACKSON SHARER** as sales and finishing specialist for the Industrial Finishes Division of the company. His territory will include Connecticut, Westchester and the Bronx.

Mr. Sharer's industrial experience includes over 24 years with Servel, Inc. as paint engineer, and 5 years with the sales department of Reliance Varnish Company, Louisville, Ky.

Lee H. Morrison

LEE H. MORRISON of New York has been named editor of "Plating," succeeding Alexander L. Korbelak, it was announced by P. Peter Kovatis, executive secretary of the American Electroplaters' Society, publisher of the monthly. Mr. Morrison's appointment is effective with the August issue of the magazine.

Mr. Morrison joins "Plating" with more than twenty years of editorial experience. He has engaged in newspaper, magazine, and book publishing, as well as public relations and publicity.

Prior to joining the staff of "Plating," he was director and editor in chief of Avery Press, a New York book publishing firm. He also served as editor at International Correspondence Schools, Scranton, Pa.; editor at the Columbia University Press, New York; editor of Public Utilities Fortnightly, Washington, D. C.; editor of Mexican Commerce and Industry, Mexico City; and editor of the Monterrey Times, Monterrey, Mexico.

Mr. Morrison is a graduate of Columbia University, New York.

The National Chemical & Plastics Company of Baltimore, has announced the appointment of **PAUL W. BINCKLEY** as district sales manager.

Mr. Binckley has been identified with the industrial finishing business for the

Over 47
SQUARE
INCHES
Seam-Free
Work
Surface!
on New
PIONEER
Stanflex
Plastic-Coated Work Gloves
Custom-fit, single seam lining (pat. pend.)—no seams on face of fingers, thumb, palm to chafe hands, wear out first. Elastic-knit jersey shapes to hand.
Wing-style thumb, curved fingers fit naturally, complete action freedom.
Tough bonded-vinyl coating won't peel or crack, always flexible, has amazing resistance to cuts, snags, abrasion — outwears leather. Satin-finish gives positive over-all grip. Watertight, resists oils, acids, caustics, most chemicals.
PIONEER Stanflex plastic-coated work gloves available in knit wrist, gauntlet, band top styles. Write today for complete information.
The PIONEER Rubber Co.
285 TIFFIN ROAD
WILLARD, OHIO
PIONEER
Stanflex
Quality Gloves for 35 years

P.S. If your glove problems are unusual because of the nature of your product finishing operations, PIONEER welcomes the opportunity to help you solve them. Write us about your needs and problems — you'll save money, improve your glove service.

past 30 years, and his expert knowledge of products and their method of application has earned him the confidence of many users of finishing materials.

He will represent the company as district sales manager of Pennsylvania, New York and the New England States.

James H. Hennessey

JAMES H. HENNESSEY has joined the industrial sales and service staff of Wyandotte Chemicals Corporation. Mr. Hennessey is a graduate of Germantown Academy, has been a resident of Philadelphia for six years and was recently general manaager of a firm specializing in industrial storage tank cleaning.

Following intensive training at Wyandotte Chemicals' Industrial Research and Technical Service Laboratories, Mr. Hennessey will serve the metal working and metal finishing industries in the greater Philadelphia area.

ROBERT W. CLARKE has been named manager of the new Pennsylvania Salt Manufacturing Company's plant at Delaware, Ohio. Announcement of his appointment has been made by Albert H. Clem, president of the Pennsalt Chemical Specialties Division, under which the new plant will operate.

Mr. Clarke, a native of Portland, Oregon has had a wide variety of experience in Pennsalt's engineering and manufacturing departments at several of the company's plants. Previous to his appointment as manager of the Delaware, Ohio plant, for which ground was broken on June 17, he was supervisor of production controls for the Industrial Chemicals Division with offices in Philadelphia.

He is a member of the American Chemical Society and the American Institute of Chemical Engineers.

VANCE N. WILSON has been appointed manager of the new Pennsylvania Salt Manufacturing Company plant at Chicago Heights, Illinois, for which ground was broken on July 8. The announcement was made by Albert H. Clem, president of the Chemical Specialties Division.

Mr. Wilson, a native of Fairmont, West Virginia, holds Bachelor of Arts and Master of Business Administration degrees from the University of Michigan. He started his employment with Pennsalt as a student trainee in February, 1941. Later he became supervisor of the company's tank car operations and a supervisor of Industrial Relations. He was superintendent of the Bryan, Texas plant from January, 1952 to January, 1954.

PAUL A. FINN recently joined the industrial sales and service staff of Wyandotte Chemicals—manufacturer of specialized cleaners for the petroleum and metal processing industries. Mr. Finn will work from Wyandotte Chemicals' Dallas office, will headquarter in Houston and will specialize in petroleum maintenance service.

Paul A. Finn

At one time connected with an aviation company on Long Island, Mr. Finn for 7 years was in charge of a chemical laboratory serving the petroleum and metal processing industries. He was recently southwest regional sales manager for a chemical research firm serving the industrial cleaning industry.

Mr. Finn is a member of the American Petroleum Institute, American Electroplaters' Society, Society of Automotive Engineers and the American Society of Mechanical Engineers.

Allied Research Products, Incorporated, manufacturer of the Iridite line of chromate conversion coatings for nonferrous metals and ARP Plating Chemicals, has announced the appointment of **FRANCIS B. BRYANT** as its representative in Iowa and portions of adjacent states. Mr. Bryant will make his headquarters at 403—26½ Street, Bettendorf, Iowa and will report to A. L. Poe, district sales manager, 20 East Jackson Blvd., Chicago, Illinois.

H. W. SMOCK has been appointed superintendent of the Sherwin-Williams Company's Chicago lacquer department, succeeding Fred H. Lang who has retired. Announcement of the appointment was made recently by W. A. Miller, general manager of the firm's Chicago operations.

Mr. Smock joined Sherwin-Williams in 1939 after receiving his Bachelor's degree from Illinois Wesleyan and his Master's degree from the University of Illinois. He has held various positions in the firm's laboratories and operating departments, and from December, 1951 until September, 1953 was chief industrial engineer. Before being named to his present post he was assistant superintendent of the lacquer department.

T. R. Gill

Highlighting a major expansion program at The General Supply Company, and The G. S. Equipment Company, 3517 St. Clair Avenue, Cleveland, Ohio, is the election of **T. R. GILL** as president and a member of the board at both firms.

Mr. Gill is also vice president of The Singleton Company, manufacturer of metal finishing equipment featuring exclusively fusion-welded "H-T Sincolite," located at the same address. He is general manager and a director for all three corporations.

General Supply is distributor for an extensive line of materials and supplies for metal finishing. G. S. Equipment serves the field with equipment of its own design and manufacture, as well as Singleton and other national makes.

Mr. Gill is widely known in the chemical processing and metal finishing fields. He is a graduate Chemical Engineer from Michigan State, a Registered Professional Engineer and a past officer of the Cleveland Branch of The American Electroplaters' Society.

Distributor in Canada for all three firms is Armalite Co. Ltd., Crystal Arts Square, Toronto 6, Ontario.

JEROME E. SPRATT is the most recent addition to the Los Angeles staff of Oakite Products, Inc., manufacturer of industrial cleaning and metal treating materials. For the past fourteen years, Mr. Spratt has been with the Mission Appliance Corporation in Hawthorne, where he was manager of the finishing department, among others.

Jerome E. Spratt

A resident of Downey, he will serve the metal working industries in East Los Angeles, Alhambra, Glendale, and South Pasadena. Mr. Spratt recently completed an intensive eight-week training course at Oakite's New York research and engineering laboratories, and in the field.

The **1955 INDUSTRIAL FINISHING EXPOSITION** will be held in conjunction with the **42ND ANNUAL CONVENTION** of the **AMERICAN ELECTROPLATERS' SOCIETY** in Cleveland Public Auditorium, Cleveland, Ohio, June 20-23, 1955. The Educational Sessions and business meetings of the 42nd AES Convention will be held under one roof in the same building as the Industrial Finishing Exposition. It is anticipated that over 200 exhibitors will utilize a total of 100,000 square feet in the Arcade and Upper Level of the auditorium.

The 1955 Industrial Finishing Exposition will be attended by over 12,000 production supervisors, engineers, chemists and other executives from the over 8000 electroplating and industrial finishing plants in the United States. Cleveland Public Auditorium is located in the geographical center of this industry and is overnight from 90 per cent of these plants.

Exhibitors will be those companies who manufacture equipment, supplies and services used in the industrial finishing and electroplating plants. Items to be exhibited will be the latest developments in services and products that enable the

industrial finisher and electroplater to make his own product better with greater sales appeal and durability.

The American Electroplaters' Society has selected the American Decorating Company, Cleveland, Ohio, to manage the 1955 Industrial Finishing Exposition. Harold E. Bartlett and Albert W. Erickson, of American Decorating Co., will serve as exposition managers.

The Cleveland Branch of the American Electroplaters' Society will be host for the 42nd Annual Convention and the 1955 Industrial Finishing Exposition. The convention committee is composed of E. L. Combs, Diamond Alkali Co., and C. F. Ott, Aircraft Plating and Polishing Co., general chairmen; F. H. Bruening, Oakite Products, Inc., chairman of the banquet sub-committee; John B. Winters, R. O. Hull and Co., chairman, educational program; J. D. Little, McGean Chemical Co., chairman, entertainment; J. T. Hyduke, Durable Plating and Supply Co., chairman, finance; J. W. Baker, Cleveland Platers Supply Co., chairman, publicity; R. W. Renton, R. W. Renton and Co., chairman, athletic events; W. F. Acks, Bechtel-Laughlin Co., chairman, convention registration; W. M. King, Cleveland Graphite Bronze Co., chairman, plant visitation and Mrs. A. R. Hoffman, Hoffman Plating Co., chairman, ladies activities.

The Exposition Committee, under the chairmanship of Leon R. Westbrook, consultant, includes as committeemen: Howard H. Blouch, Chromium Corp. of America; Eugene L. Combs, Diamond Alkali Co.; H. E. Head, Chrysler Corp.; P. P. Kovatis, executive secretary of A.E.S.; and Dr. Ralph A. Schaefer, Clevite-Brush Development Co., division of Clevite Corp., A.E.S. president.

TRAINING COURSES

FREE COURSE IN ELECTROPLATING. The course of study in Electroplating given at the **BROOKLYN EVENING TECHNICAL HIGH SCHOOL,** 29 Fort Greene Place, Brooklyn, N. Y., will begin its Fall term session on September 15, 1954. Classroom discussion and laboratory experiments, relating to electroplating, divide the time for the course. Classroom topics include simple calculations for tank capacities, tank formulas, reading of graphs and the meaning of Baumé scale measurements. To better understand the operation of the tank, the fundamentals of elementary chemistry and series and parallel circuits are discussed. Additional topics include brighteners, pH, wetting agents, buffer agents, pitting and deionizing. In the laboratory individual experiments on samples of plating solutions are carried out. Methods of analyses for copper, nickel, chromium and silver baths are performed by the members of the class; additional laboratory work covers Hull Cell studies, pH meter operation, anodizing, plating on plastics, thickness measurements.

Registration begins September 13, 1954 and daily thereafter from 7:00 to 9:00 P.M. Classes meet on Tuesday and Thursday from 6:45 to 8:15 P.M. plus about six (6) Friday evenings for the term. The term begins September 15, 1954 and ends January 28, 1955. Ask for Mr. L. Serota in Room BW17 or 3E10.

The second class in the current Fall session of The **BINKS SCHOOL OF SPRAY PAINTING** will be held October 4 through October 8 at the company's main plant in Chicago. Applications for the free course should be made by writing to E. F. Watts, Binks Manufacturing Company, 3122 Carroll Avenue, Chicago 12, Illinois. This is important because classes are kept to a maximum of 25 to insure more personalized attention. Reservations for hotel or other accommodations can be made at the same time.

For many years, men from all parts of the country have been attending this free industrial school. Although prior experience in spray painting is not a requirement for attendance, most of these men have been connected with firms or industries which use spray painting equipment. They have included foremen and supervisors, jobbers and their salesmen, executives, production engineers, and others who supply industrial paints and coatings of all kinds.

The course is conducted by William Beacham, nationally known paint chemist and spray painting authority. He is also director of the Binks Research Department. Special quarters have been built to house the school. The latest audio-visual aids are used in the instruction.

NECROLOGY

JOHN E. STERLING, 79, a past president and honorary member of the A.E.S., died June 18. Mr. Sterling was first employed in the polishing room of Seliger and Toothill Novelty Co., Oswego, N. Y., and prior to his retirement in 1949 he was employed by C. A. Lansberg of Paterson, N. J. Mr. Sterling made outstanding con-

tributions to the progress of the A.E.S. and of the New York Branch.

EDWARD J. ST. ARNAUD, charter member of the Toledo Branch, A.E.S., died July 24 at the age of 79 years.

Mr. St. Arnaud served as treasurer of the Toledo Branch and took a very active part in branch and society affairs. He attended branch meetings until June, when he became ill.

DR. DWIGHT T. EWING, 66, professor emeritus of chemistry at Michigan State College and an international authority on electroplating and electrodeposition, died of a heart attack on August 5, 1954.

Dr. Ewing came to Michigan State College as a chemistry instructor in 1914 and became a professor of chemistry in 1930. He retired from the faculty in June, 1953, but continued to serve as a consultant to the chemistry department.

In his 39 years at Michigan State, Dr. Ewing was active in the fields of chemical spectroscopy, surface chemistry, and the physical and chemical separation of vitamins. During his career he was the author of approximately 75 professional papers and held seven patents on electroplating chromium and other electrochemical processes.

After receiving his B.S. degree at Parsons College, Fairfield, Ia., he taught at a Carroll, Ia., high school from 1911 to 1913. He served as a principal of the same school from 1913 to 1914 and then came to East Lansing. Dr. Ewing received the M.S. degree in 1915 and the Ph.D. degree in 1920, both at the University of Chicago.

Dr. Ewing was chairman of the M.S.C. section of the American Chemical society four times, was a member of the Jackson-Lansing Branch of the American Electroplaters' Society, the Electrochemical Society, the American Optical Society, and the American Association for the Advancement of Science.

During World War I, he conducted research on mustard gas and during World War II worked on the Manhattan project. He received the Michigan State College Sigma Xi "Award of Merit" at the annual banquet on May 24, 1948.

His professional memberships also included Alpha Chi Sigma, chemical professional fraternity; Phi Kappa Phi and Sigma Xi, honorary fraternities.

Dr. Ewing served as director of A.E.S. Research Project No. 5, "Effect of Impurities and Purification of Electroplating Solutions," conducted at Michigan State College. He was co-author of a paper, "Effects and Removal of Lead as an Impurity in Nickel Plating Solutions," presented at the 41st A.E.S. Convention held in New York in July. Among Dr. Ewing's other activities at the recent A.E.S. Convention was his attendance as the guest of honor at a Michigan State Alumni Breakfast (see page 48 of the August issue of PRODUCTS FINISHING).

MATHEW P. IDING, founder and president of M. P. Iding Grinding Compound Co., died on August 13.

In 1920 Mr. Iding applied for patents covering Disc Grinding Compounds and Polishing Wheel Cements, and founded the company bearing his name. He was generally acknowledged to be the originator of cold cements for polishing wheels and belts.

meetings OF INTEREST TO FINISHERS

Sept. 8-10. Porcelain Enamel Institute, 16th Annual Shop Practice Forum, University of Illinois, Department of Ceramic Engineering, Urbana, Illinois.

Sept. 12-17. Annual Meeting, American Chemical Society, Division of Paint, Plastics and Printing Ink Chemistry, New York, N. Y.

Sept. 16-17. 1954 Semi-Annual Meeting, American Hot Dip Galvanizers Assn., Inc., Hotel Dennis, Atlantic City, N. J.

Oct. 3-7. Electrochemical Society, Fall Meeting, Boston, Mass.

Oct. 30-Nov. 5. 36th National Metal Congress and Exposition, American Society for Metals, International Amphitheatre, Chicago, Ill.

Nov. 18-20. Federation of Paint and Varnish Production Clubs, Annual Meeting, Palmer House, Chicago, Illinois.

June 20-23, 1955. 42nd Annual Convention and 4th Industrial Finishing Exposition, American Electroplaters' Society, Municipal Auditorium, Cleveland, Ohio.

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REPRINTS AVAILABLE

A limited number of reprints of the following articles from PRODUCTS FINISHING are available to readers without charge.

"Bright Nickel Process Simplifies Bumper Manufacture,"
by Robert D. Miller.

"Chemical Surface Treatment Extends the Durability of KoolVent All-Weather Aluminum Awnings,"
by Norman P. Gentieu, American Chemical Paint Company, Ambler, Pa.

"Electroless Plating in Production,"
by Thomas A. Dickinson.

"Filter Out Your Plating Rejects,"
by Ezra A. Blount, Editor.

"Finishing Floor Registers and Grilles at The Auer Register Company,"
by Ezra A. Blount, Editor.

"Finishing Refrigerators with Hot Sprayed Enamel,"
by Frank L. Bonem.

"Flock Coating Practices,"
by Arthur P. Schulze.

"Flow Coating Range and Heater Parts,"
by Ezra A. Blount, Editor.

"Hard Chrome Plating Made Easy,"
by Ezra A. Blount, Editor.

"Hot Spray Finishing of Machine Tools,"
by Roy W. Hill, Besly-Welles Corporation.

"How to Finish Metal Products by Vacuum Metallizing,"
by J. Gordon Seiter.

"Hub Caps Plated and Enameled in Conveyorized Setup"

"Plan Your Finishing Facilities and Operations,"
by Thomas J. Menzel, Jack S. Steele Co., Philadelphia, Pa.

"Production Barrel Plating to Specifications,"
by Ezra A. Blount, Editor.

"Sulfamate Nickel Plating,"
by Dr. C. Fred Gurnham, Contributing Editor.

"Tips on Buffing Aluminum Castings"

"Work Simplification Programs for the Metal Finisher,"
by S. J. Fecht.

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36. Centrifugal Dryer. A brochure available from Nobles Engineering and Mfg. Co., 645 E. Seventh St., St. Paul 6, Minn., describes the Nobles Air Drawn Centrifugal Dryers for rapid drying of small parts after electroplating or other process steps. Construction features and operating advantages of the dryers are described.

37. Contact Wheel. The R54 precision machined and balanced rubber contact wheel for use with abrasive belts in polishing operations is described in literature available from Chicago Rubber Co., Inc., 2620 N. Clybourn Ave., Chicago, Ill.

38. Equipment for Electroplating. An illustrated catalog describing equipment for cleaning, processing, plating, drying, baking, and allied operations is being distributed by the U. S. Galvanizing & Plating Equipment Corp., 27-41 Heyward St., Brooklyn 11, N. Y. The brochure includes descriptions of equipment for barrel plating, automatic plating, still tank plating, semi-automatic plating, in a number of different kinds of installations showing the many designs available.

39. Jet Blast Bulletin. A bulletin describing the Jet Blast Abrasive Blasting Machine for use in removing rust, scale, and foreign deposits from precision parts without dimensional alterations, and for other processes in connection with paint finishing, electroplating, and other finishing processes, is being distributed by R. W. Renton Co., 877 Addison Rd., Cleveland, Ohio.

40. Barrel Finishing Compounds. Moco burnishing barrel compounds for use in the barrel finishing of various metals in tumbling, burnishing, or deburring processes, are described in a catalog available from the Mosher Co., 15 Exchange St., Chicopee, Mass.

41. Scratch Brushes. Dixrip fine wire scratch brushes for platers, silversmiths, jewelry and instrument manufacturers, are described in a catalog and price list available from Dixon & Rippel, Inc., Department P, Kingston, New York.

42. Golden Jubilee Brochure. An illustrated, descriptive folder issued in commemoration of the 50th Anniversary of the Chandeysson Electric Co., 4078 Bingham Ave., St. Louis, Mo., is being distributed by the company. The folder outlines the company facilities for building Chandeysson motor generator sets and includes a brief history and progress report on the company's growth and development.

43. Buffing Lathes. Standard MB2 Buffers for high production polishing and buffing are described in Catalog 44, available from the Standard Electrical Tool Co., 2518 River Road, Cincinnati 4, Ohio. Standard MB2 Buffers are available in sizes ranging from two 3 h.p. motors to two 30 h.p. motors with speeds as specified.

44. Protective Linings for Industry. An illustrated catalog describing the Koroseal and Neoprene tank linings, facilities for rubber dipping, insulated pipe and fittings, exhaust systems, acid-resisting brick and mortar, sectional steel tank units, metal and rubber fabricated products, and accessories supplied by the company, is available from Perma-Line Rubber Products Corp., 1753 N. Winnebago Ave., Chicago 47, Ill.

45. Immersion Steam Boiler. The Sellers Model 105 horizontal one pass immersion fired steam boiler, designed specifically for automatic gas firing, is described in an illustrated catalog available from Sellers Engineering Co., 4876 N. Clark St., Chicago 40, Ill.

46. Plating Equipment. An illustrated catalog listing alphabetically all the metal finishing equipment and supplies supplied by the company is available from Pesco Plating Equipment Corp., 75 Wythe Ave., Brooklyn 11, N. Y. A great many items of equipment such as plating barrels, tumbling barrels, electrical equipment, filters, polishing lathes, dryers, backstands, air compressors and motor generations are illustrated in the folder. Construction features and operating characteristics of many of the items are included.

47. Temperature Regulator. An illustrated leaflet describing details of the construction, operation, and application of the Powers No. 11-MF self operating temperature regulator is available from Powers Regulator Co., 3400 Oakton St., Skokie, Illinois. Brief descriptions of other Powers temperature regulators are included in the leaflet together with installation photos showing typical applications for the products.

48. Dust Collectors in cabinet cloth filter and cyclone separator types are described in a catalog prepared by Torit Mfg. Co., 314 Walnut St., St. Paul 2, Minnesota.

USE CARD FOR FREE LITERATURE

49. Liquid Honing. Vapor Blast Mfg. Co., 3025 W. Atkinson Ave., Milwaukee 16, Wis., has issued a bulletin describing liquid honing, a method of surface finishing using fine abrasive powders suspended in a chemical solution and forced at high velocity against the surfaces to be treated.

50. Automatic Plating Machine. Bulletin B 50-54 describes the Wagner Brothers' fully Automatic Plating Machine. The literature contains a comprehensive explanation of the parts transfer and conveying principle which permits highly efficient processing of parts through the entire plating. Drawings and illustrations show basic movements. Bulletin B 50-54 available from Automatic Plating Equipment Division, Wagner Brothers, Inc., 432 Midland Ave., Detroit 3, Michigan.

51. Plating Racks and Tips. Naraco has released a 24 page catalog containing information on racking methods and tip constructions for plating and finishing. The book is planned to acquaint you with fundamental tip, or work holder, forms and basic racking procedures. To obtain your copy write to Naraco, Dept. PF1, 1109 Stewart Ave., Flint, Michigan.

52. Wire Stripping Solutions. Various types of X-VAR wire-stripping solutions are described in a sheet produced by the Fidelity Chemical Products Corp., manufacturer of cleaning and stripping materials for industrial requirements, 474 Frelinghuysen Ave., Newark 5, N. J. Strippers for formex, formvar, enamel, Nylon and nylclad wire are described. X-VAR stripping solutions are used by electronic firms and government agencies to remove organic finishes from wire.

53. Filter Press Catalog. A fully revised edition is a complete source of current information about industrial filtration equipment and methods. Written more as a text and reference manual than as a selling brochure, it contains classified sections devoted to full discussions on the nomenclature and advantages of the plate filter type press; a detailed comparison of flush plates and frames versus recessed plates; construction features of the various leakproof, wood, and special type plates; graphic specifications on all standard Sperry Filter Presses, Sperry Closing Devices and accessories, filterable materials and filter bases; as well as the terminology and step-by-step digest of the entire filtration operation. Free copies of the Sperry Catalog and Specification Book will be sent upon request to D. R. Sperry & Co., Dept. PRF, Batavia, Illinois.

54. Specification Lacquers. A handy guide to specification lacquers for finishing military items is available from Hercules Powder Co., Cellulose Products Dept., Wilmington 99, Deleware. The folder lists Military, U. S. Army, U. S. Air Force, U. S. Navy, Joint Army-Navy (JAN), and Federal Specifications for various paints, lacquers, and similar products used by these agencies. The specification numbers together with the name of the material corresponding to the specification are listed in order, classified according to the different services concerned.

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55. Protective Finishes for Metals. A folder containing descriptive data sheets on the many products available from the Mitchell-Bradford Chemical Co., 2441 Main St., Stratford, Conn., is available from the company. Included in the folder are descriptions of Black Magic conversion finishes, black finishes for various metals, chromate dips, rust proofing oils and waxes, rust removers, acid cleaners, pickling addition agents, anti-staining additives, metal cleaners, and heat treating salts.

56. Sulfate Test. A bulletin describing the Kocour Sulfate Test Set for determining sulfate in chromium plating solutions and the Kocour Electric Centrifuge for determining sodium sulfate and magnesium sulfate in nickel plating solutions is available from Kocour Co., 4814 S. St. Louis Ave., Chicago 32, Ill.

57. Paint Heater Data Sheet. An illustrated data sheet showing how Turner's Paint Warmer can be incorporated into a number of different painting systems is being distributed by Turner Paint Heater Co., 8240 Sandy Lane, Cincinnati 24, Ohio. The paint warmer is electrically operated and can be used to increase paint temperature to a maximum of 180 deg. F.

58. Nickelite Folder. The use of Nickelite as an addition agent for producing bright barrel nickel deposits is described in a technical bulletin available from Platers Research Corp., 59 E. 4th St., New York 3, N. Y. Suggested bath formulas and a data sheet listing approximate plating time to obtain specified deposits of various metals is included in the folder.

59. Lilly Varnish Company Booklet. An illustrated booklet available from Lily Varnish Co., Indianapolis, Ind., describes the founding and development of the company and its facilities for the manufacture of industrial finishes in the various company plants in Indianapolis; High Point, N. C.; and Gardner, Mass. Various manufacturing operations are illustrated as well as control laboratory, development and research laboratory facilities. The company maintains research laboratories at Purdue University as well as in the company plants. Manufacturing facilities for varnish, lacquer, stain, filler, pigmented coatings, coatings for metal lithography, and other products are illustrated and described in the booklet.

60. Alsop Liquid Processing Equipment. A catalog containing photos, diagrams, and comprehensive information on the entire Alsop line of stainless steel liquid processing equipment, including filters, filter discs, mixing and storage tanks, portable mixers, fixed-side and top-entering agitators and transfer pumps, is available from the Alsop Engineering Corp., 908 Keen St., Millidale, Conn. The features of each product are described clearly and completely with an explanatory text, numerous plant installation illustrations, design variations, detail drawings and parts lists, applications and performance data.

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6 Free rinsing—leave no salts or other deposits that bleed out after painting.

Whatever your spray washing operations, you are guaranteed better results, lower costs when you call in the Detrex field technician.

The soil being removed, the type of spray washing equipment you are using and all other influencing factors are first thoroughly analyzed by the Detrex technician. This survey is made *without* disrupting your operations in any manner. Then, after careful study, he will recommend a cleaner tailored to your needs along with specific data on the improved performance you can expect from it.

But that's not all of the story . . . Detrex service continues, on a regular basis, for as long as you use the operation! The Detrex technician visits your plant at reasonable intervals to make certain that top efficiency is maintained and that you are kept abreast of constantly improving techniques; he even assists in the training of personnel if you desire.

It all adds up to what we call "Service with a Saving" . . . one of the important values on which our business has been built.

Investigate the benefits of Detrex spray washer cleaners for your plant. An easy way to do it is to write for information . . . how about doing it now.

DETREX DETROIT

DETREX CORPORATION

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